

**Report 10734
Final
April 1996**

**Integrated Advanced Microwave Sounding Unit-A
(AMSU-A)
WBS Diagram And Task Description Dictionary**

**Contract No. NAS5-32314
CDRL 015**

Submitted To:

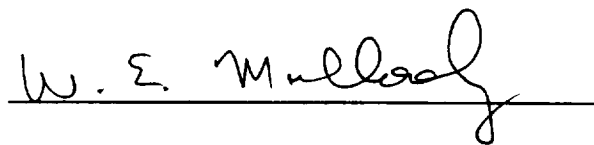
**National Aeronautics And Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771**

Submitted by:

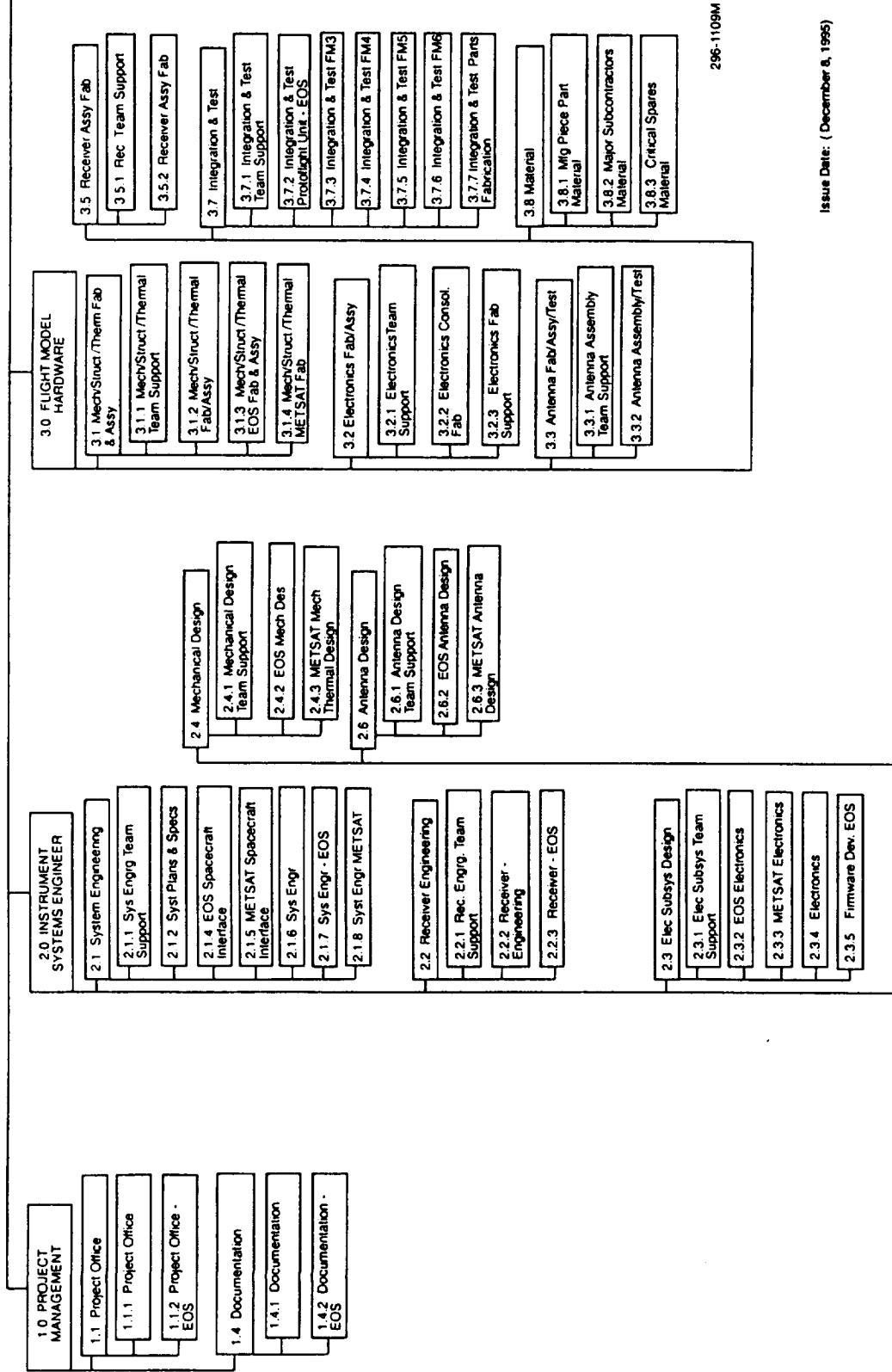
**Aerojet
1100 West Hollyvale Street
Azusa, California 91702**

Foreword

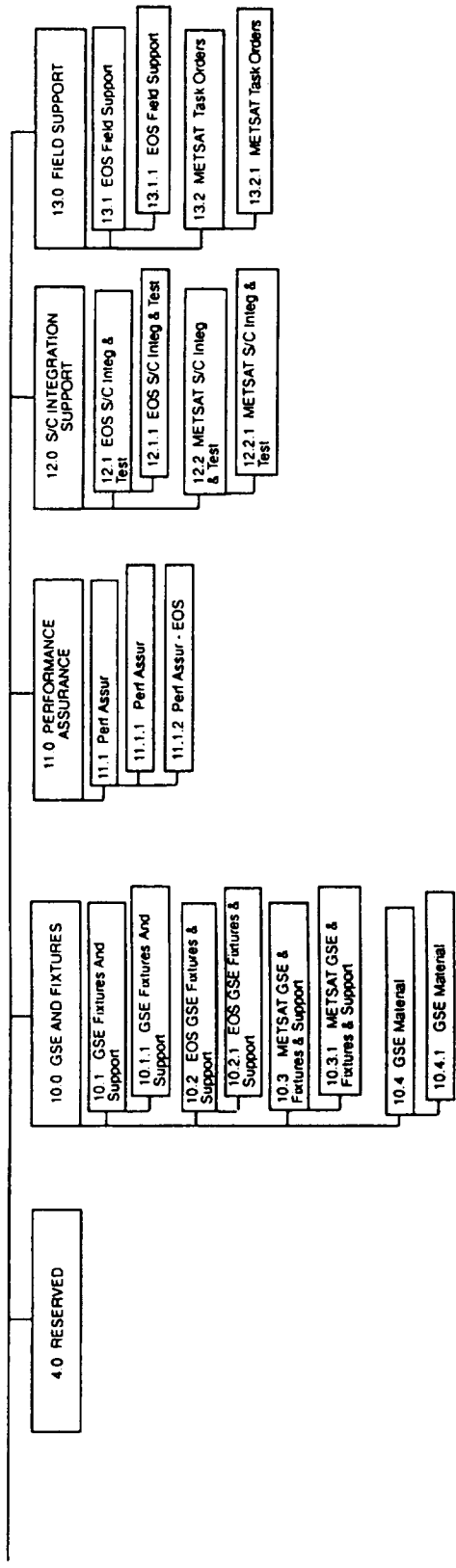
This WBS Diagram and Task Description Dictionary is resubmitted for coordination and approval in response to Contract NAS 5-32314, CDRL 015.

A handwritten signature in dark ink, reading "W. E. Mullooly", is written over a horizontal line.

W. E. Mullooly
Director
NOAA/NASA Programs



Issue Date: (December 8, 1995)



296-1109M

WBS Dictionary

Contract Work Breakdown Structure Dictionary	Program: Integrated AMSU-A	RFP No.: 5-16372/433 Contract No.: NAS5-32314	Date: 26 February 1996
Level of CWBS CWBS Element	CWBS Definition		
4 1.1.1	<p>PROJECT OFFICE - COMMON Provide Program Management of the Integrated AMSU-A program in accordance with the requirements of the Statement of Work Paragraphs 1.1, 1.2 and 2.1.</p> <p>These efforts include the following : Program Managers, Travel for the Program Office, Contracts Administration, Graphics and duplicating for general program requirements, Business Operations for the Program Office, Material Program Management for the Program, and Production Management.</p> <p>All Program Management and control associated with SOW paragraph 2.1 including:</p> <p>A) Project planning and control per SOW paragraph 2.1.1 which will follow the guidelines established for PMS planning wherever practical.</p> <p>B Schedule reporting and control associated with SOW paragraph 2.1.2. Schedule reporting shall be in accordance with CDRL 004. The contractor shall provide the Government with a series of integrated network schedules and bar charts as described below:</p> <ul style="list-style-type: none"> a. Level #1 Master Schedule b. Intermediate Logic Networks c. 90 Day Window Report d. End Item Float Report e. Monthly Analysis <p>C) Type I Monthly Progress Reports will be generated per SOW paragraph 2.1.3.1</p> <p>D) The WBS shall be controlled, documented, and reported on in accordance with paragraph 2.1.3.2</p>		

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4	1.1.1	<p>PROJECT OFFICE - COMMON (CONTINUED) REVIEWS AND MEETINGS SECTION 4.0 OF SOW Conduct review meetings at AESC for the following items. All the reviews in section 4.0 are listed for completeness even though they are not included in this budget.</p> <ol style="list-style-type: none"> 1. (4.1) Project Initiation Meeting NOT INCLUDED IN BUDGET 2. (4.2) Design Concept Review NOT INCLUDED IN BUDGET 3. (4.3) Quarterly Status Reviews 4. (4.4) PMS Compliance Review NOT INCLUDED IN BUDGET 5. (4.5) Software Requirements / Preliminary Design Review NOT INCLUDED IN BUDGET 6. (4.6) Preliminary Design Review NOT INCLUDED IN BUDGET 7. (4.7) Software Critical Design Review NOT INCLUDED IN BUDGET 8. (4.8) Critical Design Review 9. (4.9) Calibration Peer Review NOT INCLUDED IN BUDGET 10. (4.10) Calibration Peer Review NOT INCLUDED IN BUDGET 11. (4.11) Software test Readiness Review 12. (4.12) Pre-Environmental Test Review 13. (4.13) Software Acceptance Review NOT INCLUDED IN BUDGET 14. (4.15) Pre-Shipment Reviews 15. (4.16) MPDDBR NOT INCLUDED IN BUDGET 16. (4.17) Manufacturing Readiness Review NOT INCLUDED IN BUDGET 17. (4.18) Monthly Status Review 18. (4.19) Special Meetings 		

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4 1.1.2	<p>PROJECT OFFICE - EOS Provide Program Management of the EOS AMSU-A Program Prior to incorporation of Modification 18 (which incorporates the Integrated AMSU-A program) in accordance with the requirements of the Statement of Work Paragraphs 1.1 and 2.1. This WBS also includes EOS unique activities to support program management which take place post delivery of the EOS unit.</p> <p>These efforts include the following ; Program Managers, Travel for the Program Office, Contracts Administration, Graphics and duplicating for general program requirements, Business Operations for the Program Office, Material Program Management for the Program, and Production Management.</p> <p>All Program Management and control including: (COMPLETE)</p> <p>A) Project planning and control (COMPLETE)</p> <p>B) Type I Monthly Progress Reports (COMPLETE)</p> <p>Provide Engineering Management activities prior to incorporation of Modification 18 including:</p> <p>A) Lead Systems Engineering Efforts (COMPLETE) B) Schedule reporting and control (COMPLETE) C) Support of an EOS cost reduction study (COMPLETE)</p>	

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4	1.4.1	<p><u>DOCUMENTATION - COMMON</u></p> <p>This element includes the compilation, review, reproduction, and distribution of all documentation identified as deliverable items. The task includes the creative effort to organize and prepare the documents, layout and publication services, editing, and other non-technical documentation efforts. The task does not include the actual writing of the documents, as this effort is covered under the respective WBS elements.</p> <p>Prepare selected CDRLs described in Attachment A of the contract. These CDRLs that require preparation are listed below;</p> <ol style="list-style-type: none"> 1. CDRLs 01-39 Plans and Reviews 2. CDRLs 101-114 Math Models and Analysis 3. CDRLs 201-226 Engineering and Test Reports 4. CDRLs 301-309 Specifications and Operations 5. CDRLs Procedures 401-415 <p>SOW Reference: 3.0</p>	

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4 1.4.2	<p><u>DOCUMENTATION - EOS</u> This element includes the compilation, review, reproduction, and distribution of all documentation identified as deliverable items. The task includes the creative effort to organize and prepare the documents, layout and publication services, editing, and other non-technical documentation efforts. The task does not include the actual writing of the documents, as this effort is covered under the respective WBS elements.</p> <p>SOW Reference: 3.0</p>		

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<p>4 2.1.1</p>	<p>SYSTEM ENGINEERING TEAM SUPPORT</p> <p>1. As required, in the statement of work (SOW) sec. 2.1 & 2.2, provide technical direction/management and general systems engineering coordination for the AMSU-A system engineering. It includes cost, schedule and manpower management. The task will be performed by a lead systems engineer and a fiscal analyst. The lead system engineer is responsible for providing technical direction, making technical decisions, planning and executing the task, cost control and interfacing with the customer, Program Office and other team members/team leaders. Lead system engineer's responsibility also includes the supervision and inspection of the output of the task. Cost and schedule duties will involve tracking current team expenditures and accomplishments in relation to planned cost and milestones. A fiscal analyst will assist and provide all necessary data to the lead systems engineer for cost control and tracking. Additionally the lead system engineer will provide management of GSE tasks that are planned during the phase I, II & III up to the system CDR. After the CDR the GSE task will be managed by the lead system engineer under WBS 3.7.1 The following task will be managed by the lead system engineer under the WBS 2.1.1 up to CDR.</p> <p>a) Sys. Engineering Common WBS 2.1.6 e) Sys. Engineering EOS Unique WBS 2.1.7 b) Sys. Plans & Procedures WBS 2.1.2 f) Sys. Engineering METSAT Unique WBS 2.1.8 c) EOS S/C Interface WBS 2.1.4 g) GSE & Fixtures WBS 10.0 d) METSAT S/C Interface WBS 2.1.5 h) Configuration Mgmt and Data Mgmt</p> <p>2. Applicable specifications: S-480-79, S-480-80, GISS 3267415, UIIS 2617547, GIRD 422-11-12-01, UIID 422-12-12-02. Also reference letter "Integrated AMSU-A Technical Clarifications and Requirements" sent to the attention of Ms. Nancy Faman Lockard on 19 Sept. 95.</p> <p>3. Excluded from this element is material cost, deliverable hardware, and travel expenses, included is labor cost.</p> <p>4. Output will be management of technical, schedule, and cost relating to the AMSU-A task per item 1.</p>		

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4	2.1.1		<p>SYSTEM ENGINEERING TEAM SUPPORT (Continued)</p> <p>Configuration/Data Management - will provide the technical and administrative direction and surveillance required for configuration management of the hardware and software of the METSAT AMSU-A (4 shipsets), the EOS AMSU-A and all GSE/STE during design, fabrication, assembly, test and preship review of the units.</p> <p>In the MRP II database, maintain the Master Configuration Control List including the Engineering Bill-Of-Materials (BOMs) and Manufacturing BOMs.</p> <p>Perform release function of all engineering data including drawings, specifications, reports, software and firmware and all changes thereto.</p> <p>Review and process engineering changes, Engineering Change Notices (ECNs), Software Change Requests (SCRs), Configuration Change Request (CCRs), deviations and waivers through the Program Configuration Change Board (PCCB), serve as secretary to the PCCB, coordinate documentation changes with Drafting and Specification Engineering groups, review and release revised documentation, maintain controlled distribution lists.</p> <p>Maintain the CM Library, including deliverable software, test data and engineering documentation.</p> <p>Maintain the appropriate level of configuration control for each established baseline, as defined in the CM plan.</p> <p>Maintain Configuration Status Accounting records.</p> <p>Prepare and maintain the following CDRLs:</p> <ul style="list-style-type: none"> CDRL 005 Configuration Management Plan 203 CM Status Report 509 Approved or Controlled Drawings 512 Class I 515 Drawing Trees 518 Indented Drawing List 510 Request for Deviation/Waiver 538 Configured Articles List <p>Provide Configuration Management support to the Program Office and support reviews and audits.</p>	

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4	2.1.1	<p>SYSTEM ENGINEERING TEAM SUPPORT (Continued)</p> <p>Task Outputs/Products: Create/update the Engineering Bill-Of-Materials (EBOMs) for release with engineering drawings, generate the Master Configuration List, Where Used List and other MRP reports for utilization by Manufacturing, Quality Assurance, Engineering and the Program Office.</p> <p>Release and distribute dispositioned ECNs and revised engineering documentation.</p> <p>Update library indices and distribute</p> <p>Update Product Data Management (PDMS) folders.</p> <p>Submit customer ready CDRLs 005, 203, 509, 512, 515, 518 and 510, 538 to Data Management.</p> <p>Coordinate the preparation of the Acceptance Data Package(s) and provide it for shipment with each unit.</p> <p>Participate in major program reviews and audits, prepare presentation material, resolve CM issues and action items.</p> <p>Data Management - In accordance with the SOW and Contract Data Requirements List (CDRL), perform the Data Management tasks for the AMSU-A Integrated Program.</p> <p>Prepare and present status and tracking of CDRLs to the Program Office.</p> <p>Notify responsible parties of approaching CDRL submittal dates.</p> <p>Compose customer transmittal letters, obtain approvals.</p> <p>Ensure correct quantity of reproduction copies per the CDRL, packaging, labeling, distribution, shipment of each CDRL.</p> <p>Task Outputs/Products - Master Data Scheduling showing planned CDRL submittals.</p> <p>During the Weekly Program Team Meeting, present a Status Report of planned and actual submittals for the current month and 90 day window.</p> <p>Issue CDRL Action Requests (CAR) to responsible parties for the CDRL 30 days prior to due date.</p> <p>Output transmittal letters, distribute and file transmittal letters.</p> <p>Proper packaged and labeled CDRLs are delivered to the Mail Room for shipment.</p>		

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4	2.1.1		<p><u>SYSTEM ENGINEERING TEAM SUPPORT (Continued)</u> Subcontract Data Management - Manage the Subcontractor Data Requirements activities for the Integrated AMSU Program.</p>		
			<p>Establish and maintain a tracking and statusing database of SDRLs. Prepare and present Status Reports to the Program Office. Maintain a filing system of all SDRLs. For SDRLs requiring approval, ensure Aerojet's timely response to our subcontractors. Copy and distribute each SDRL for disposition in accordance with the SOW SDRLs. Consolidate internal reviewers comments and submit to the Program Office.</p>		
			<p>Task Outputs/Products: Status Reports on SDRL activities to be presented to the Program Office. Prepare SDRL Action Requests and copy of SDRL to each reviewer. Filing system for all SDRLs. Prepare summary memo of reviewers comments.</p>		
			<p>SOW Reference: 2.1, 2.2, 3.0, 4.8</p>		

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4 2.1.2	<p>SYSTEM PLANS AND SPECIFICATIONS</p> <p>As required, in the Statement of Work (SOW) section 2.2, perform engineering task to update, revise and/or generate plans, procedures and specifications. The specific scope of work is as follows:</p> <ol style="list-style-type: none">1. Using EOS/AMSU-A report #10360 as a baseline, modify, for the combined program, areas concerned with S/C interface and environmental requirements. Modify document as necessary to produce a revised Performance Verification Plan (CDRL 022). Final due at CDR. One update is planned after CDR.2. Using EOS/AMSU-A AE-26594 as a baseline, generate METSAT/AMSU-A Performance Verification Specification (CDRL 308). Special attention will be paid to the areas of S/C interface and environmental requirements. Final due at CDR, one update is planned after CDR.3. For the antenna subsystem used in both A1 & A2 instruments, update EOS/AMSU-A spec.'s for combined METSAT/AMSU-A specification. Areas to be addressed includes: Antenna RF, Antenna Drive, Calibration, Mechanical, and Thermal Subsystems. This review encompasses revision/updates for each addressed area (Antenna RF, Antenna Drive, . . . ,etc.) by instrument engineering, no aggregate review of these documents will be performed by systems engineering. CDRL 301-1.4. Update EOS/AMSU-A Receiver Subsystems Specification for METSAT/AMSU-A requirements. CDRL 301-2.5. Update EOS/AMSU-A Electronics Specification for METSAT/AMSU-A. Areas to be addressed include the Spacecraft Interface. CDRL 301-3.		

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4 2.1.2	<p>SYSTEM PLANS AND SPECIFICATIONS - (Continued)</p> <p>6. Update the Handling Procedure (AE26357) to incorporate changes made in handling the instruments at the different stages of integration and test. Review changes and incorporate comments. The output of this task will be a draft copy. One time NASA comment incorporation is planned. (CDRL 406).</p> <p>7. Develop a plan/procedure for storage for the A1 and A2 instrument. (CDRL 24).</p> <p>8. Develop a method(s) to test the instrument while in storage. (CDRL 407).</p> <p>Outputs will be five revised plans and specifications that define the instrument subsystem performance requirements and testing method. The majority of these procedures will be in draft form.</p> <p>Applicable specifications are: S-480-79, S-480-80, GISS-3287415, UIIS-2617547, UIIS-2624483. Also reference letter "Integrated AMSU-A Technical Clarifications and Requirements" sent to the attention of Ms. Nancy Faman Lockard on 19 Sept. 95.</p> <p>Excluded from this element is the cost for CDRL and technical document publication, reproduction, and distribution.</p> <p>Only one time NASA comments incorporation is planned and included in this cost account. SOW Reference: 2.2,3.0.</p>		

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4 2.1.4	<p><u>SPACECRAFT INTERFACE - EOS</u></p> <p>1. As required in the statement of work (SOW) SEC. 2.2</p> <p>Coordinate interface characteristic with Spacecraft contractor and NASA.</p> <p>Prepare the Command List Description Document in accordance with CDRL 303. Delivered and accomplished before contract mod.</p> <p>Prepare the Telemetry Description Document in accordance with CDRL 305. Delivered and accomplished before contract mod.</p> <p>Prepare inputs to NASA for IDD updates as required in accordance with CDRL 519. Preliminary delivered before contract mod.</p> <p>Prepare Interface Control Document Input (CDRL 516) - Initial plus two updates. Initial delivered before contract mod.</p> <p>Prepare AMSU-A Instrument Operation and Maintenance manuals in accordance with CDRL 307. Final and one update is included in this W.B.S. travel expenses TRW, R.B.CA. is included in this W.B.S. Prepare Performance Instrument/Spacecraft Verification Procedures in accordance with CDRL 412.</p> <p>2.Applicable specifications: S-480-79, S-480-80, GIRD 422-11-12-01, UIID 422-12-12-02.</p> <p>3. Excluded from this element of cost is material cost deliverable hardware.</p> <p>4. Output will be listed CDRL above.</p> <p>SOW Reference: 2.2, 3.0</p>		

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4 2.1.5	<p><u>SPACECRAFT INTERFACE - METSAT</u> As required, in the Statement of Work (SOW) sec. 2.2 & 4.19, this task involves reviewing/commenting on documents and participation in interface meetings for the METSAT instrument.</p> <p>The specific scope of work follows:</p> <ol style="list-style-type: none">1. Review the interface documents (UJIS-2617547, UJIS-2624483, and GJIS-3267415) for the respective A1 & A2METSAT instrument. Identify needed changes and consider changes proposed by the spacecraft contractor.2. Provide support for the four Interface meetings to be held at Aerojet to discuss the mentioned UJIS and GJIS documents.3. Provide support for the two Interface meetings to be held at the spacecraft contractors facility in New Jersey.4. Review three documents (GICD, ICD-A1, & ICD-A2) for the METOP instruments and support six meetings at the spacecraft contractor in Amsterdam and two meetings at GFSC. <p>Reference letter "Integrated AMSU-A Technical Clarifications and Requirements" sent to the attention of Ms. Nancy Farnan Lockard on 19 Sept. 95. This letter will be referenced when reviewing the above documents.</p> <p>Output will be reviewed documents (1 each GJIS, 2 each UJIS, 1 each METOP GICD, and 2 each ICD). Also, attendance at various meetings as outlined above.</p> <p>Excluded from this element is material and hardware cost, Field of View (FOV) review by an antenna engineer and A2 baseplate changes by a mechanical engineer.</p>		

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4 2.1.6	<p>SYSTEM ENGINEERING</p> <p>As required, in the Statement of Work (SOW) sec. 2.2, 4.3, 4.8, 4.12, 4.16, 4.17, this task involves manufacturing process and document baseline review which includes drawings and shop orders. Two drawings are required for each of the following: ICDs, top level, and wirelists. In addition, work in the following task are included:</p> <ul style="list-style-type: none">a) Instrument level test procedures review/update and evaluateb) MRPR review and update NOAA IMITP and support MRPR and support action itemsc) MPDDBLR Report effort per SOW 4.16d) CDR and CDR action itemse) MRR and MRR action itemsf) Quarterly reviews at NASA and Aerojetg) Radiometric Budgets and Allocations Maintenanceh) Major/critical components reviewi) Phase III Implementation/MFG. Eng.j) Environmental Eng. Shop Order/OP & OC <p>The specific work involved for the above task is as follows:</p> <ol style="list-style-type: none">1. For the Manufacturing Process and Design Documentation "Baseline Review" (MPDDBLR) effort, review shop order on the existing NOAA/KLM contract, identify items that need modification or creation of documentation and establish an action plan.2. Review two Interface Control Documents (ICD), two top level drawings, and two top level wirelists for the respective A1 and A2 instruments. This work package includes environment shop orders (SO), operating procedures (OP), and other chambers (OC) documentation review as well as generation of an MPDDBLR report. (CDRL 036).3. For the integration and testing of both and A1 and A2 instruments; review the top level test procedures in support of the MPDDBLR report effort. Identify areas requiring modification or correction.		

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4	2.1.6		
SYSTEM ENGINEERING - (Continued)			
<p>4. For the Material Resource Planning (MRP); review, update the NOAA IMITP, and resolve action items that have been identified. IMITP (CDL0233). Modify the Fabrication and Assembly Flow Plan to accommodate changes from NOAA/KLM Integrated Manufacturing integration & Test Plan (CDRL 023). Document will be generated in its initial revision and only updated once (before the PER for FM3). Also, no updates will be made for FM4 to FM6. Deliverable format consist of block diagram(s) & approximately 5 pages of text. Final due at CDR, one update is planned after CDR.</p> <p>5. For the CDR; provide support to develop and present the CDR system level data. Prepare to provide answers on action items that have been identified. Support and preparation includes one dry run. Included in this work package is generation of rough draft only.</p> <p>6. For the Manufacturing Readiness Review (MRR); provide support and prepare answers to any action items identified. This include two shop orders, MAIs, and the instrument handling procedure (AE26357).</p> <p>7. For the Radiometric Budget; update and maintain allocation budgets related to NEΔT, calibration accuracy, linearity, frequency stability, and beam pointing. This activity will be required through the delivery of critical items.</p> <p>8. For Major / Critical Components Reviews; provide systems engineering support for all critical and major design reviews at subcontractors facilities. Included in this components category is DC/DC converters, Dielectric Resonator Oscillator (DRO), Mixer / IF, Drive Motors, IF Amplifiers, A2 Reflectors, Waveguide Attenuators, RF Detectors, and SAW filters.</p> <p>9. For Phase III Shop Order (SO) and Material Resource Planning (MRP) implementation; provide support to implement the SO and MRP. Generate modularized S.O. to be used for both EOS and METSAT.</p> <p>Applicable specifications are: S-480-79, S-480-80, GISS-3267415, UUIS-2617547, UUIS-2624483.</p> <p>Output will be participation in meetings, generation of responses to action items, new or revised documents, maintenance of budgets.</p> <p>Excluded from this element is material cost; support for quarterly meetings to be held at NASA, change board support, and finalized CDR documentation and copies for distribution.</p> <p>Included in this element is cost for travel.</p>			

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4 2.1.7	<p>SYSTEM ENGINEERING - EOS As required in the statement of work (SOW) sec. 2.2 and 3.0</p> <ol style="list-style-type: none"> 1. Provide review and allocation of all EOS/AMSU-A specification requirements. Completed before contract mod. 2. Allocate and flow down system requirements to subsystems and develop subsystem specs. Completed before contract mod. 3. Provide requirements flowdown and support development of component specs. Completed before contract mod. 4. Prepare previously designed hardware report in accordance with CDRL 201. Completed before contract mod. 5. Update component drawings to incorporate changes identified by suppliers and convert the drawings from envelope drawings, which cannot be used for control and inspection of the parts, to source control drawings, to which parts must be verified. Completed before contract mod. 6. Establish modified AMSU-A system architecture in accordance with new instrument requirements. Completed before contract mod. 7. Provide a worst case analysis report in accordance with CDRL 112. Completed before contract mod. 8. Prepare Calibration Management Plan in accordance with CDRL 018. Completed before contract mod. 9. Prepare Control of Unscheduled Activities according to CDRL 516. Completed before contract mod. 10. Prepare and generated 4 system level Drawing and two interconnect diagrams. 11. Establish and maintain EOS weight and power budgets for instrument subsystems and components and report monthly in accordance with CDRL 503. Initial established before contract mod. 12. Provide Systems Engineering coordination and participation in subsystem design reviews. 13. Develop an AMSU-A radiometric math model in accordance with CDRL 101. Preliminary delivered before contract mod. 14. Prepare Operational In-Flight Check Out Plans in accordance with CDRL's 025, update before CDR. 15. Prepare Top Assy level shop orders by using modularized shop order prepared in WBS 2.1.6. 16. Prepare & develop Systems Integration and Test Procedure (AE 26156/8 & 7) to incorporate changes from NOAA/KLM. This includes incorporating "safe to mate" procedures based on the new instrument interconnect cabling system. The output will be a draft copy. One time NASA comment incorporation is planned. CDRL 409. 17. Develop the System Comprehensive and Limited Performance Test procedures (AE26156/8 & 9) to incorporate changes from NOAA/KLM instruments. Output will be a draft copy. One time NASA comment incorporation is planned. CDRL 409. 18. Modify the System Calibration Procedure (AE26156/10 & 11) to incorporate changes from NOAA/KLM instruments. 19. Update, review, and incorporate comments to the EMI/RFI & Magnetic Fields Test Procedure (AE26151/8). One time NASA comment incorporation is planned. CDRL 409. 20. Update, review, and incorporate comments to the Thermal Vacuum Cycle Test Procedure (AE26151/9). One time NASA comment incorporation is planned. CDRL 409. 		

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4	2.1.7	<p>SYSTEM ENGINEERING - EOS (Continued)</p> <p>21. Update, review and incorporate comments to both the Vibration and Acceleration, and Weight and C.G. Test Procedures. (AE26151/10). One time NASA comment incorporation is planned.</p> <p>22. Develop the Thermal Balance Test procedure (AE-26151/11).</p> <p>23. Prepare the following environmental shop orders:</p> <ul style="list-style-type: none"> a) Vibration b) T/V cycle and calibration c) Wt and c.g. <p>Applicable specifications: S-480-79, S-480-80, GIRD 422-11-12-02, U-IID 422-12-12-02. Also reference letter "Integrated AMSU-A Technical Clarifications and Requirements" sent to the attention of Ms. Nancy Faman Lockard on 19 Sept 1995.</p>		

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4 2.1.8	<p>SYSTEM ENGINEERING - METSAT As required, in the Statement of Work (SOW) sec. 1.2, 2.2; 5.0 provide support to incorporate / develop design to accommodate changes from NOAA/KLM for top assembly. Specific work under this element follows:</p> <ol style="list-style-type: none">1. Provide support for Phase III implementation to incorporate and/or develop design to accommodate changes from the NOAA/KLM for the top assembly. This includes drawings, parts list for drawings 1331720 and 1331200.2. Develop and maintain a weight and power baseline for adherence throughout the program. (CDRL 503)3. Provide support for Phase III implementation of manufacturing shop orders (SO). This includes the SO for the top assembly of the A1 and A2 instruments. Generate METSAT unique SO & assy. procedure using modularized SO generated in W.B.S.2.1.6.4. Provide support for Phase III implementation of environmental shop orders (SO), operating procedures (OP), and OC for the A1 and A2 instruments. Update 15 documents and develop new OP/OC documents for A1 testing such that two A1 instruments maybe calibrated at the same time in two separate thermal vacuum chambers.5. Provide support to update and maintain AMSU-A1 and A2 instrument interconnect diagrams.6. Modify the Systems Integration and Test Procedure (AE 26156/1 & /2) to incorporate changes from NOAA/KLM. This includes incorporating 'safe to mate' procedures based on the new instrument interconnect cabling system. The output will be a draft copy. One time NASA comment incorporation is planned. CDRL 409.7. Modify the System Comprehensive and Limited Performance Test procedures (AE26156/3 & /4) to incorporate changes from NOAA/KLM instruments. Output will be a draft copy. One time NASA comment incorporation is planned. CDRL 409.		

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4 2.1.8	<p>SYSTEM ENGINEERING - METSAT - (Continued)</p> <p>8. Modify the System Calibration Procedure (AE26156/5 & 6) to incorporate changes from NOAA/KLM instruments. One time NASA comment incorporation is planned. CDRL 409.</p> <p>9. Update, review, and incorporate comments to the EMI/RFI & Magnetic Fields Test Procedure (AE26151/5). One time NASA comment incorporation is planned. CDRL 409.</p> <p>10. <u>No update or review to the Thermal Balance Test Procedure (AE26151/2) will be made within this element.</u></p> <p>11. Update, review, and incorporate comments to the Thermal Cycle Test Procedure (AE26151/7). One time NASA comment incorporation is planned. CDRL 409.</p> <p>12. Update, review, and incorporate comments to both the Vibration and Acceleration, and Weight and C.G. Test Procedures. (AE26151/1 and AE26151/3 respectively). One time NASA comment incorporation is planned. CDRL 409.</p> <p>13. Develop a procedure to measure the residual momentum of the A2 instruments while it is operating in the full scan mode. Development of this procedure will be made by a structural engineer with minimum participation from a systems engineer. One time NASA comment incorporation is planned. CDRL 409.</p> <p>Applicable specifications are S-480-79, S-480-80, GISS-3267415, UIIS-2617547, UIIS-2624483.</p> <p>Output will be updated documents for Phase III implementation, weight and power data base that is maintained throughout the program, and updated interconnect diagrams for A1 and A2 instruments.</p> <p>Excluded from this element is cost for material, travel, document processes such as, reproduction, publication, and distribution/shipping.</p>		

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4	2.2.1	<p><u>RECEIVER ENGINEERING TEAM SUPPORT</u></p> <p>1. Receiver Team Leader - This effort provides for the management of the receiver team. It is focused on activities up to the CDR in April 1996. The team leader is responsible for cost, schedule, manpower, and technical direction. Duties will largely entail the evaluation of the receiver progress, the identification and application of the required resources, and technical direction to all parties participating in the receiver production.</p> <p>Cost and schedule duties will include generation of the C/SCSC baseline and tracking current team expenditures and accomplishments in relation to planned costs and milestones. This effort includes interaction and meetings with the cost analyst, meetings with management, variance reports, PMS compliance review, etc.</p> <p>Manpower duties will involve the identification of any tasks related to the receiver build (including all documentation) and the subsequent planning and direction of the needed resources to get the job done. This duty also includes the supervision and inspection of the output of any task.</p> <p>The receiver team leader has understanding of the receiver function and is the focal point for technical matters. In this capacity, the team leader will make technical decisions and give advice, based on overall knowledge, team input, analysis, measurement, etc. This includes interface with other teams, support organizations, vendors, Aerojet management, and the customer.</p> <p>2. Cost Analyst - A fiscal analyst will assist and provide accurate and timely information to the receiver team for control of cost and schedule. As part of this effort, the detailed activities will include:</p> <ul style="list-style-type: none"> • Maintain program budgets and work authorization documents. • Coordinate PMS processing, summary, re-planning and data. • Monitor cost/schedule status, corrective actions, and variances. • Preparation of customer cost reports, internal cost reports, data reconciliation, and variance analysis. • Preparation and review of funding requirements. • Maintain the PMS monthly input, support PMS compliance review. • Provide custom analysis for the CAM, Program Office, or customer as needed. <p>SOW Ref: para 2.1 - Program Management para 2.2 - Instrument Systems Engineer para 4.4 - PMS Compliance Review para 4.8 - CDR</p>		

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4	2.2.2	<p>RECEIVER ENGINEERING - COMMON</p> <p>This effort includes a wide variety of receiver engineering activity. Procedures, specifications, reports, presentations, meetings, interface, and test equipment design are included. The specific scope and source of the requirements are generally focused to pre CDR activities. These are listed as follows:</p> <p>1. Receiver/PLO Test Procedure and Specification - Generation, modification, and maintenance of the receiver/PLO procedures and specifications will be performed in accordance with the requirements of the AMSU program. These documents are CDRLs due in October 1995 for the specifications, and 30 days prior to first test for the procedures. The documents are defined as follows:</p> <table><tr><td>CDRL</td><td>301-1</td><td>Receiver Specification</td><td>AE-26608</td></tr><tr><td></td><td>409B</td><td>Test Procedure, Receiver Subsystem For AMSU-A</td><td>AE-26002/6</td></tr><tr><td></td><td>301-5</td><td>PLO Specification</td><td>AE-26633</td></tr><tr><td></td><td>409E</td><td>Test Procedure, PLO For AMSU-A Receiver</td><td>AE- TBD</td></tr></table> <p>2. Weekly & Monthly Reports - The weekly report (CDRL #521) and the monthly report (CDRL #529) will be generated each week/month for the receiver team effort. This will include all research, analysis, and actual generation of the physical document to be delivered to the program office and integrated into the overall system report. The subject matter will include all receiver and PLO activity for the time period indicated.</p> <p>3. Monthly/Quarterly Status Review Meetings - The receiver team will support the corresponding section of the quarterly review. This presentation will include engineering and manufacturing accomplishments for the previous 3 months. The subject matter will cover technical, cost, manpower, and PMS performance and will include a 9 month forecast.</p> <p>4. CDR Presentation - The receiver team will support the corresponding section of the CDR. This presentation will cover the design of the receiver and PLO in detail, and verify that they meet the requirements of the S-480-80 specification. Historical data from the KLM program, test results from the MM&T PLO, and critical vendor data, will support the presentation. This effort will include all research, analysis, and actual generation of the view graph material to be presented at the CDR.</p> <p>5. Manufacturing Readiness Review - This effort includes engineering only (exclusive of manufacturing and other disciplines) support of the MRR as described in the SOW section 4.17.</p>			CDRL	301-1	Receiver Specification	AE-26608		409B	Test Procedure, Receiver Subsystem For AMSU-A	AE-26002/6		301-5	PLO Specification	AE-26633		409E	Test Procedure, PLO For AMSU-A Receiver	AE- TBD
CDRL	301-1	Receiver Specification	AE-26608																	
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	301-5	PLO Specification	AE-26633																	
	409E	Test Procedure, PLO For AMSU-A Receiver	AE- TBD																	

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4	2.2.2	<p>6. <u>Receiver Test Equipment Design</u> - This effort provides for the electronic team to design, for the receiver team, three test sets (special test equipment). These three test sets will condition and supply power to the receiver shelves during the ATP. The electronics team will also design 7 detector/pre-amp test boxes to support the receiver tests. Parts procurement will also be covered in this work package.</p> <p>7. <u>Team Meetings, Team Communication</u> - Weekly team meetings will be held where all the core and satellite receiver team members will communicate to establish status, problems, priorities, and direction. This process assures coordinated and efficient effort between all team members.</p> <p>8. <u>Surface Mount Technology Line Certification</u> - The SMT line at Aerojet will be qualified per the plan agreed upon by Aerojet/NASA. Project is guided by: S-311-M-677 (Contractor Survey Guide), S-312-M-001 (Requirements for Qualification of Contractors to Produce Surface Mount Technology Assemblies), and IPC-SM-785 (Guidelines for Accelerated Reliability Testing of Surface Mount Solder Attachments). Provides for test boards/components to be designed, fabricated, and tested as well as providing the final report and support of NASA inspection along the way.</p> <p>9. <u>PLO Subsystem CDR</u> - This effort will cover the research, viewgraph preparation, and actual presentation of the subsystem CDR for the PLO. The presentation will present the flight design and configuration using the measured results of the MM&T model as support.</p> <p>10. <u>PLO Analysis & Robustness</u> This effort is to update the Engineering Analysis of the PLO, which includes Thermal, Mechanical, and Reliability.</p>		

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4	2.2.2	<p>11. <u>MM&T PLO TV Testing</u> - This task consists of thermal vacuum testing of the PLO per the agreed upon plan with NASA. The unit's performance will be measured over temperature, in a vacuum, and under a variety of conditions per the plan. A final report will be generated illustrating the performance in comparison with the specification. SOW Ref.</p> <p>para 2.1.3 - Reporting Requirements para 2.3 - EOS Protoflight Model para 2.4 - Metsat Flight Model 3 para 2.5 - Metsat Flight Model 3 para 2.6 - Metsat Flight Model 4 para 2.7 - Metsat Flight Model 5</p> <p>11. <u>MM&T PLO TV Testing</u> - (Continued) para 2.8 - Metsat Flight Model 6 para 3.0 - Required Plans and Other Documents para 4.16 - Mfg. Process & Design Documentation Baseline Rev para 4.17 - Mfg. Readiness Review para 4.18 - Monthly Status Meetings para 4.3 - Quarterly Status Review para 4.8 - Critical Design Review</p> <p>12. <u>Test Procedures And Specifications - PLO</u> This effort includes the generation, modification, and maintenance of the PLO Test Procedure. Output: CDRL 409E</p> <p>13. <u>Pathfinder PLO Build</u> This effort includes fabrication of solder fixtures, programming the MRSI pick & Place equipment, build of five CCAs, and PLO assembly & test.</p>		

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4	2.2.3	<p>RECEIVER ENGINEERING - EQS</p> <p>1. <u>Receiver</u> - This element provided receiver design confirmation activities and the preparation of receiver component specifications. Also included in this activity was technical support to the procurement process, including: vendor selection, fact finding, sole source justifications, requisition verification/approval, technical interchange, etc.</p> <p>2. <u>Phase Locked Loop Oscillator</u> - This work included PLO design and long lead parts procurement. Analysis was done in a number of areas including thermal, mechanical, and electrical. Parts issues were addressed as well as manufacturability. NSPARS were generated for a number of long lead components.</p> <p>SOW Ref: 1.2, 2.3</p>		

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Level of CWBS	CWBS Element	2.3.1	CWBS Definition
4		ELECTRONICS TEAM SUPPORT - DESIGN PHASE	<p>Provide Electronics Team support for:</p> <ol style="list-style-type: none"> 1) Level of effort Team Leader for cost account management, project management, and customer interface 2) Fiscal analyst support to cost account management 3) Updates or revisions to electronics specifications and test procedures 4) Project and Team Reviews, support for attendance, preparation, presentation, materials and action item follow -up 5) Electronics Team periodic meetings <p>SOW Ref: Para 1.1 - EOS Scope Para 1.2 - METSAT Scope Para 2.1 - Program Management Para 2.2 - Instrument Systems Engineering</p>

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Level of CWBS	CWBS Element	4	2.3.2
		<p style="text-align: center;">CWBS Definition</p> <p>ELECTRONIC SUBSYSTEM DESIGN - EOS UNIQUE</p> <p>The design, analysis, development, breadboard, prototype, test and documenting of all EOS unique electronic subsystems including:</p> <ol style="list-style-type: none"> 1) Digital processor and the Mil-Std-1553 command and data handling interface and all digital processor circuit card assemblies 2) Analog processor including housekeeping functions, telemetry functions, and the related circuit card assemblies 3) Power Subsystem including power control and distribution functions, instrument wiring and backplane, and related circuit card assemblies 4) Integrated Signal Processor assemblies for A1 and A2 modules including card cages, test procedures, and interfaces to other subsystems 5) System interconnect cabling subsystem 6) Drafting and Release of design drawings and documents 7) Fabricate, assemble and checkout Signal Processor Breadboards for A1 and A2 card cages for the EOS configuration. Existing residual CCAs from contract NAS5-29402 will be used and EOS prototype backplanes will be fabricated. 8) Using the EOS Signal Processor Breadboards, test and validate the integrated card cage and backplane design configuration and implementation. <p>SOW Ref: Para 1.1 - EOS Scope Para 2.2 (a,b,c) - Instrument Systems Engineering</p>	

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Level of CWBS CWBS Element 4	2.3.3	CWBS Definition	
	ELECTRONICS DESIGN - METSAT UNIQUE Design, Analyze, develop, test, and document all new and modified electronic subsystem elements of the METSAT AMSU-A instrument necessary to support the System design and meet System requirements. Specifically: 1) A1 and A2 backplane wire wrap design and wire list drawing 2) Instrument interconnect cabling design and drawings for implementation of a connectorized cabling system 3) Design, drawing prep, and prototype fab and test of new Power Relay circuit card assembly and new Relay Driver circuit card assembly 4) Design & drawing prep of new Power Relay Assembly Design, develop, fabricate and test METSAT unique special test equipment necessary to integrate and test the Instrument electronics and electronic components. Specifically: 5) Two Test Relay Units (1ea for A1 and A2) to be used to test the Power Relay and Relay Driver circuit card assemblies and to provide signal processor power during bench testing 6) Drafting and design release of component and assembly drawings covered under this work element	SOW Ref: Para 1.2 - METSAT Scope Para 2.2 (d,e,f) - Instrument Systems Engineering	

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4	2.3.4	ELECTRONICS DESIGN - COMMON	
		deleted deleted deleted	
		4) Perform RF Detector moisture evaluation to validate fabrication process of potential supplier. Includes procurement of engineering samples	
		5) Periodic testing of RF Detectors	
		6) Evaluation testing of DC-DC Converter engineering model	
		7) Provide draft inputs to CDRLs: CDRL 020 - Subsystems & Systems CDR data packages CDRL 409 - Signal Processor Subsystem Test procedures CDRL 208 - Performance Verification reports (EOS A1&A2, METSAT A1&A2 for units 1 thru 4) CDRL 112B - Worst Case Analysis, Electrical	

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4	2.3.4	(continued)	
		<p>8) Upgrade and refurbish as necessary existing NOAA AMSU-A test fixtures to meet all requirements to support the Instrument build and test schedule. These include: A1 radiometric input and output boxes, universal CCA test fixtures, motor driver CCA test fixture, Interface converter CCA test fixture, R/D converter CCA test fixture, Temp A&B CCA test fixtures, and CCA extender cards</p> <p>9) Design and fab cable test boxes capable of supporting EOS & METSAT cable assembly C/O</p> <p>10) Fit check cable assemblies using 3D model and instrument mock-up to validate lengths and routing</p> <p>11) Redesign of signal processor card cage backplane as a result of breadboard testing</p>	<p>SOW Ref: Para 1.1 - EOS Scope Para 1.2 - METSAT Scope Para 2.2 - Instrument systems engineering Para 3.0 - Required plans and other documents</p>

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4 2.3.5	FIRMWARE DEVELOPMENT - EOS UNIQUE		
	<div>1) Preparation of all firmware related CDRLs (excludes the publication and duplication of documents)</div> <div>2) The design and development and test of all Mil-Std-1553 command and data handling firmware</div> <div>3) The modification of current instrument control firmware to adapt command structure to Mil-Std -1553 requirements</div> <div>4) Preparation and support to EOS firmware CDR, Firmware FQT and software acceptance review</div>		
	<div>SOW Ref: Para 1.1 - EOS Scope</div> <div>Para 2.2 (a,b,c) - Instrument Systems Engineering</div> <div>Para 3.0 - CDRL</div>		

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4 2.4.1	<p><u>Team Support-Mechanical/Thermal Design</u> Maintain and support an Integrated Product Team (IPT) for the Integrated AMSU-A Mechanical/Structural/Thermal Subsystem. Provide all team support during the Design Phase ending at Critical Design Review. During this phase, support the design, thermal analysis, structural analysis, and drafting activities by conducting regular Team Meetings. Provide coordination to support the project planning activities for the program. Support procurement of Mechanical/Structural/Thermal parts during the design phase. Support and coordinate early start fabrication activities at Aerojet. This single IPT will support both the EOS design activities (SOW 1.1) and the METSAT design activities (SOW 1.2) through a combined Program CDR. Reporting of Team Activities weekly in CDRL 521 and monthly in CDRL 529 are also included herein.</p> <p>1) This task element provides for the IPT Leader to plan, direct, coordinate, direct, and report on the Team activities. Included in this element are Team Project Planning (SOW 2.1.1), Team schedule maintenance (SOW 2.1.2), and Team fiscal reporting (SOW 2.1.3). This task element also provides the Individual team members with the resources to support the team meetings and action items resulting therefrom.</p> <p>2) This task element provides the fiscal analyst support to assist in the planning, scheduling, and reporting activities above.</p> <p>SOW 1.1, 1.2, 2.1.1, 2.1.2, 2.1.32 3.0</p> <p>Inputs to CDRLs 521 & 529</p> <p>NOTE: The individual tasks that are being supported by the team during this period are described in</p> <p>WBS 2.4.2 WBS 2.4.3 WBS 3.1.2 WBS 3.1.4</p>		

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4 2.4.2	<p>MECHANICAL/THERMAL DESIGN - EOS</p> <p>This task element continues the Mechanical/Structural/Thermal design and analysis activities prior to Critical Design Review for the AMSU-A EOS configuration (SOW 1.1). The remaining drafting and design activities for only the Mechanical/Structural/Thermal Subsystems are included. The constituent parts of the Mechanical /Structural/Thermal Subsystems are:</p> <ul style="list-style-type: none"> a) All parts of the Antenna Subassemblies (Machined) (A1 & A2) b) All mechanical parts installed at the final assemblies excepting Receiver Assemblies, Signal Processing Assemblies, Card Cages, and Preamp Detector Assemblies. c) All Thermal Control blankets, Mirrored Panels, and Thermal Isolators <p>This effort will complete the existing EOS Subsystem (as defined above) drawings for the A1 prior to CDR. It will also update the A2 design and drawings to incorporate METSAT A2 changes undertaken in WBS 2.4.3 (Baseplate Redesign) on the EOS AMSU-A design are also included. The EOS stress analysis and NASTRAN model based on the new A2 Baseplate Redesign will be completed in this task element.</p> <ul style="list-style-type: none"> 1) Incorporate changes, check and release the updated EOS Subsystem drawings (SOW 1.1) for the A1. 2) Incorporate the A2 Baseplate redesign into the EOS Subsystem drawings and release EOS configurations. 3) Update the A2 NASTRAN model, EOS configuration, to conform to the requirements of GIRD 11.1. Based on updated model, perform stress analysis using EOS environments. Prepare inputs for CDRLs 102 & 113 for A2.. 4) Prepare for and support CDR. <p>SOW 1.1, 2.2b, 3.0, 4.8 UIID 3.2.1, 5.0-2), 5.0-21) GIRD 3.6, 3.7, 4.1, 4.2, 4.3, 4.4, 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7, 11.0 POS 3.10.2, 3.10.3, 4.6, 6.4 PAR 2.3b), 3.4.1, 3.4.2, 3.4.3, 3.4.4, 3.4.7, 3.4.9, 3.6.1, 3.6.2, 3.6.3, 3.6.5, 4.3 CDRLs 102, 103, 113</p> <p>Specifically Excluded from this effort:</p> <ul style="list-style-type: none"> 1) EOS A1 Stress Analysis Report (CDRL 113) and NASTRAN model (CDRL 102) (These were completed and released in June 1995 as reports 10372 and 10381) 2) Preparing EOS Thermal Math Models (CDRL 103) (Delivered as Report 10373 in May 1995). 3) Revising EOS Thermal Predictions 4) Revising EOS Thermal ICDs 5) Delta CDRs 		

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4	2.4.3	MECHANICAL/THERMAL DESIGN METSAT This task element provides the Mechanical/Structural/Thermal design and analysis activities prior to Critical Design Review for the AMSU-A METSAT configuration (SOW 1.2). The drafting and design activities for only the Mechanical/Structural/Thermal Subsystems are included. The constituent parts of the Mechanical /Structural/Thermal Subsystems are: a) All parts of the Antenna Subassemblies (Machined) (A1 & A2) b) All mechanical parts installed at the final assemblies <u>excepting</u> Receiver Assemblies, Signal Processing Assemblies, Card Cages, and Preamp Detector Assemblies. c) All Thermal Control blankets, Mirrored Panels, and Thermal Isolators This effort will update the existing METSAT Subsystem (as defined above) drawings to incorporate ADCNs as mutually agreed between Aerojet and NASA. Updating the METSAT Subsystem drawings to reflect improvements were initiated on the EOS AMSU-A design are also included. Design improvements to the existing heritage design, including the A2 Baseplate Redesign to increase the natural frequency are included in this task element. 1) Incorporate ADCNs, check and release the updated METSAT drawings (SOW 1.2). 2) Redesign the A2 Baseplate and other structure to increase the natural frequency of the unit above 100 Hz. 3) Update the A1 and A2 NASTRAN models, METSAT configuration, to conform to the requirements of GIRD 11.1. Based on updated models, perform stress analysis using METSAT environments. Prepare inputs for CDRLs 102 and 113. 4) Revise A1 and A2 SINDA and TRAYSES thermal math models per GIRD 11.2.2 and 11.2.4. Prepare the CDR version CDRL 103. 5) Prepare orbital temperature predictions and perform thermal model maintenance prior to CDR. 6) Perform the METOP unique thermal design. 7) Prepare the post-thermal balance test version of the thermal math models and reduced SINDA models. SOW 1.2, 2.2b, 3.0, 4.8 GLIS 3.2.9, UIIS 3.2.11, 3.2.2.1, 3.3.2, 3.3.3 POS 3.10.2, 3.10.3, 4.5.2, 4.6, 6.4 PAR 2.3b), 3.4.1, 3.4.2, 3.4.3, 3.4.4, 3.4.7, 3.4.9, 3.6.1, 3.6.2, 3.6.3, 3.6.5, 4.3, Appendices C, D, &E CDRLs 102, 103, 113		

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4	2.4.3	<u>MECHANICAL/THERMAL DESIGN METSAT (Continued)</u>	
		<p><u>Specifically Excluded from this effort:</u></p> <ol style="list-style-type: none"> 1) Updating A1 and A2 thermal interface control drawings as found in POS 4.6.3.6 2) Preparing reduced SINDA models per GIRD paragraph 11.2 3) Preparing METOP unique orbital interface control drawings. 	

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4 2.6.1	<p><u>ANTENNA DESIGN TEAM SUPPORT</u> Perform all team support functions including technical review support, weekly and monthly reviews of work and team leader support.</p> <p>1) Support all technical reviews including program initiation meeting, manufacturing processes and design documentation baseline review, critical design review, calibration peer review and manufacturing readiness review.</p> <p>2) Provide support for quarterly, monthly and weekly reviews/reports</p> <p>3) Provide team leader support including cost and schedule management, periodic status reviews and team management.</p> <p>4) Provide fiscal analyst support to team.</p> <p>SOW Reference Paragraphs: 1.1, 1.2, 2.1.2, 2.1.3.0, 4.1, 4.3, 4.4, 4.8, 4.9, 4.16, 4.17, and 4.18, CDRL Numbers: 521 and 529</p>		

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4	2.6.2	<div> <div>ANTENNA DESIGN - EOS</div> <div> <p>This account included the effort necessary for the EOS antenna design confirmation activities, the preparation of component specifications and the preparation of test plans and procedures for the antenna assemblies of the EOS/AMSU-A including reflector, feedhorn, scan mechanism and calibration sources. It also included antenna subsystem internal (Aerojet) design reviews, and instrument design reviews (DCR, PDR, CDR). Engineering support for subcontractor procurement was also included.</p> <p>SOW Reference Paragraph: 1.1, 2.3(b)(1), 4.1, 4.2, 4.3, 4.6</p> </div> </div>	

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			<p><u>ANTENNA DESIGN - COMMON</u></p> <p>Perform antenna design tasks to mitigate risks identified in the KLM NOAA/AMSU-A antenna/antenna drive assembly.</p> <ol style="list-style-type: none"> 1) Modify the A1-1 and A1-2 feedhorn designs to minimize the beamwidth clustering variance. 2) Perform early tests of the composite A2 reflector on the engineering model instrument. Tests will include antenna pattern data, beam efficiency data and random vibration tests. Document all test results. 3) Redesign, fabricate and proof test the antenna range test fixtures to accommodate the EOS A1 mounting interface and also to improve the measurement efficiency. 4) Redesign the A1 motor housing cover to increase the stiffness of the cover flange to eliminate warping of the when the motor is assembled. 5) Develop improved surface tolerance measurement techniques for the A1 reflector. Test breadboard A1 reflectors fabricated using the MM&T lathe machining technique. 6) Review drawings, specification and procedures for document assessment review. 7) Upgrade all drawing, specification and procedures as required. <p>SOW Reference Paragraphs: 1.1, 1.2, 4.1.6, 3.1 and 2.3(d)(1). POS Reference Paragraphs: 3.7.1 Clarifications to the SOW: Item 33 "Beamwidth Clustering"</p>

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3.1.1	<p>MECHANICAL/STRUCTURAL/THERMAL TEAM SUPPORT</p> <p>Maintain and support an Integrated Product Team (IPT) for the Integrated AMSU-A Mechanical/Structural/Thermal Subsystem. Provide all team support during the Procurement, Fab, and Assembly Phases starting at Critical Design Review and ending with delivery of the Antenna Subassembly (Machined) and Thermal Control for the last flight unit. Activities will be coordinated by conducting regular team meetings. Provide coordination to update the project planning activities. Support procurement of Mechanical/Structural/Thermal parts. Support and coordinate fabrication activities at Aerojet and vendors. This single IPT will support both the EOS fab activities (SOW 1.1) and the METSAT fab activities (SOW 1.2) Reporting of Team Activities weekly in CDRL 521 and monthly in CDRL 529 are also included.</p> <p>1) This task element provides for the IPT Leader to plan, direct, coordinate, direct, and report on the Team activities. Included in this element are Team Project Planning (SOW 2.1.1), Team schedule maintenance (SOW 2.1.2), and Team fiscal reporting (SOW 2.1.3). This task element also provides the Individual team members with the resources to support the team meetings and action items resulting therefrom.</p> <p>2) This task element provides the fiscal analyst support to assist in the planning, scheduling, and reporting activities above.</p> <p>SOW 1.1, 1.2, 2.1.1, 2.1.2, 2.1.3, 3.0 Inputs to CDRLs 521, 529</p> <p>NOTE: The individual tasks that are being supported by the team during this period are described in</p> <p>WBS 3.1.2 WBS 3.1.3 WBS 3.1.4</p>		

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4 3.1.2	<p>Mechanical/Structural/Thermal Fab Assembly - Common</p> <p>This task element provides for the procurement, fab and assembly of the parts of the Mechanical/Structural/Thermal Subsystem that are common to both the EOS and METSAT AMSU-A configurations. It also provides for the maintenance of Mechanical/Structural/Thermal Subsystems design documentation during the fab and assembly. The team output shall include hardware in sufficient quantities for the EOS and METSAT instruments:</p> <ol style="list-style-type: none">1) Twenty-one machined panels and other major structural parts required for each A1 Antenna Subassembly (Machined)2) Twelve machined panels and other major structural parts required for each A2 Antenna Subassembly (Machined)3) A completed A1 Antenna Subassembly (Machined) for each instrument, 1 EOS and 4 METSAT4) A completed A2 Antenna Subassembly (Machined) for each instrument, 1 EOS and 4 METSAT5) Ninety-five smaller mechanical parts including shims, insulation support brackets, setscrews, special washers, and isolators that are used in varying quantities to produce the above assemblies and the top assemblies. <p>Included in this task are manufacturing engineering floor support, production control support, shop order planning, inspection and engineering support.</p> <ol style="list-style-type: none">1) Fabricate the common mechanical parts for the EOS and METSAT units in this subsystem.2) Prepare and incorporate drawing changes into the subsystem drawings as required to support the fabrication effort.3) Provide Inspection for the manufactured parts and assemblies.4) Prepare shop order planning for all subsystem related fabrication and assemblies.5) Provide Manufacturing Engineering floor support to resolve problems during fab and assembly.6) Provide production control support for the subsystem shop orders. <p>The Subsystem part of SOW 1.1, 1.2, 2.3, 2.5, 2.6, 2.7, 2.8, GIRD 3.4 UIIS 3.2.1-1), 3.2.2.1 POS 4.5.2, 4.9</p> <p>NOTE: The thermal control tasks are described in WBS 3.1.3 for EOS and 3.1.4 for METSAT</p>		

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4 3.1.3	<p>MECHANICAL/STRUCTURAL/THERMAL FAB/ASSEMBLY - EOS</p> <p>This task element provides for the procurement, fab and assembly of the parts of the Thermal Control blankets, mirrored panels, and thermal isolators.</p> <p>Included in this task are manufacturing engineering floor support, production control support, shop order planning, inspection and engineering support.</p> <ol style="list-style-type: none"> 1) Fabricate the EOS Thermal Control parts. 2) Provide Inspection for the manufactured parts and assemblies. 3) Provide Thermal Engineering Support during fab and assembly. 4) Prepare shop order planning for all related fabrication and assemblies. 5) Provide Manufacturing Engineering floor support to resolve problems during fab and assembly. 6) Provide production control support for the subsystem shop orders. <p>The subsystem part of SOW 1.1, 2.3 GIRD 4.2 POS 3.9.1</p>		

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3.1.4	<p><u>MECHANICAL/STRUCTURAL/THERMAL FAB/ASSEMBLY - METSAT</u> This task element provides for the procurement, fab and assembly of the parts of the Mechanical/Structural/Thermal Subsystem that are unique for the METSAT AMSU-A configuration. It also provides for the maintenance of Mechanical/Structural/Thermal Subsystems design documentation during the fab and assembly. The hardware outputs of this task:</p> <ul style="list-style-type: none"> a) Thermal Control blankets, Mirrored Panels, and Thermal Isolators for \$ METSAT A1 Instruments b) Thermal control blankets and Thermal Isolators for 4 METSAT A2 Instruments c) One set of METSAT Thermal Test Blankets <p>Included in this task are manufacturing engineering floor support, production control support, shop order planning, inspection and engineering support.</p> <ul style="list-style-type: none"> 1) Support the procurement of the sidemount for the A1 METSAT units in this subsystem. 2) Prepare and incorporate drawing changes into the subsystem drawings as required to support the fabrication effort. 3) Provide Inspection for the manufactured parts and assemblies. 4) Prepare shop order planning for all subsystem related fabrication and assemblies. 5) Provide Manufacturing Engineering floor support to resolve problems during fab and assembly. 6) Provide production control support for the subsystem shop orders. 7) Fab the METSAT Thermal control parts. 8) Fabricate one set of Thermal test blankets. <p>Subsystem part of SOW 1.2, 2.5, 2.6, 2.7, 2.8 UHS 3.2.1.1-1), 3.2.2.1, 3.3.2 POS 3.9.1, 3.9.2, 4.5.2, 4.9, 4.6.3.1, 4.6.3.2, 4.6.3.3</p>		

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4	3.2.1	ELECTRONICS TEAM SUPPORT - FAB PHASE		
Provide Electronics Team support for:				
1) Level of effort Team Leader for cost account management, project management, and customer interface				
2) Updates, revisions and new drafts of electronics specifications and test procedures				
3) Project and Team Reviews, support for attendance, preparation, materials, presentation and action item follow-up				
4) Engineering & Production Control support for identification, source selection, order preparation and order placement, subcontract monitoring and management, and supplier support of all purchased parts and assemblies required to support the manufacture of all Electronic Subsystems.				
5) Travel costs in support of WP4, WP14 & WP24				
6) Draft signal processor acceptance test reports for one EOS (A1 & A2) and four METSAT (A1 & A2) units				
7) Electronics Team periodic meetings				
8) Fiscal Analyst support to cost account management				
9) CY '96 Procurement labor support for identification, source selection, order preparation and order placement, subcontract monitoring and management, and supplier support of all purchased parts and assemblies required to support the manufacture of all Electronic Subsystems				
10) CY '97 Procurement labor support				
SOW Ref: Para 1.1 - EOS Scope				
Para 2.1 - Program Management				
Para 2.3 - EOS Protoflight Model				
Para 2.6 - METSAT Flight Model 4				
Para 2.8 - METSAT Flight Model 5				
Para 1.2 - METSAT Scope				
Para 2.2 - Instrument Systems Engineering				
Para 2.5 - METSAT Flight Model 3				
Para 2.7 - METSAT Flight Model 4				

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4	3.2.2	ELECTRONICS - CONSOLIDATED FAB	
		<p>The fabrication and assembly of electronic components and assemblies including assembly labor, bargaining unit supervision, inspection labor, manufacturing engineering support, shop order preparation, production control support, design engineering support, test engineering support, and test technician support for the consolidated fabrication, assembly and test of sufficient hardware to deliver the following quantities of EOS and METSAT electronic hardware:</p> <ol style="list-style-type: none"> 1) 250 Circuit card assemblies of 23 part numbers 2) 10 Detector Pre-Amp assemblies 3) 109 Thermistor component assemblies 4) 40 I/O interface boards 5) 10 Transistor/diode assemblies 6) 15 Card cage assemblies 7) 10 Signal processor assemblies 8) 65 Cable assemblies 9) 2 Power Control Monitor assemblies 10) 8 Power Relay assemblies 11) 400 PRT Terminal Boards 	
		<p>Included in each item above is all hardware ECN incorporation and all rework and retest.</p>	
		<p>SOW Ref: Para 1.1 - EOS Scope Para 2.3 - EOS Protoflight Model Para 2.6 - METSAT Flight Model 4 Para 2.8 - METSAT Flight Model 6</p>	<p>Para 1.2 METSAT Scope Para 2.5 - METSAT Flight Model 3 Para 2.7 - METSAT Flight Model 5</p>

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4	3.2.3	ELECTRONICS - FAB SUPPORT	
		<ol style="list-style-type: none"> 1) Training and certification of manufacturing personnel to meet the NHB standards called for in the contract 2) Design, fabrication , and or selection and procurement of storage, handling and protective containers and devices for the protection and proper handling of flight hardware 3) Preparation, drafting, sign-off, and incorporation into documentation, including shop orders, of all ECNs necessary to correct any deficiencies in the design, or documentation of the instrument electronics being manufactured under WBS 3.2.2 (Implementation of any hardware changes called for in ECNs is covered under WBS 3.2.2) 4) Support to Material Review Board and Change Control Board related to any item being manufactured under WBS 3.2.2 5) Design, fabrication and/or procurement of cable assembly mock-ups and harness boards 6) Periodic Retraining & Recertification of manufacturing personnel SOW Ref: Para 1.1 - EOS Scop Para 1.2 - METSAT Scope Para 2.3 - EOS Protoflight Model Para 2.5 - METSAT Flight Model 3 Para 2.6 - METSAT Flight Model 4 Para 2.7 - METSAT Flight Model 5 Para 2.8 - METSAT Flight Model 6 	

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3.3.1	<p>ANTENNA ASSEMBLY TEAM SUPPORT</p> <p>Perform all team support functions for the fabrication and assembly of the antenna/antenna drive subassembly including team leader support, procurement support, ECN incorporation and fiscal analyst support.</p> <ol style="list-style-type: none"> 1) Provide support for quarterly, monthly and weekly reviews/reports. 2) Provide team leader support including cost and schedule management, periodic status reviews and team management. 3) Provide procurement support for all major subcontracts (motors & resolvers, bearings, feedhorns & multi-plexors, A2 Reflector) and all other as-required materials and piece parts 4) Provide engineering support to procurement for all major subcontracts. 5) Provide support for the incorporation of design changes for the antenna subsystems. 6) Provide fiscal analyst support to team. <p>SOW Reference Paragraphs: 1.1, 1.2, 2.1.2, 2.1., 3.0, 3.1, 4.18, CDRL Numbers: 521 and 529</p>		

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4 3.3.2	<p>ANTENNA ASSEMBLY FAB/ASSEMBLY/TEST</p> <p>The Antenna/Antenna Drive fabrication task consists of fabricating the metal parts that make up the antenna/antenna drive subassembly, assembling those parts into the required components and assemblies, integrating the components and assemblies into the antenna assemblies and performing component and subsystem level acceptance tests. Included in this task are assembly labor manufacturing engineering floor support, production control support, shop order planning, inspection and engineering support and test engineering required to deliver the following EOS and METSAT hardware.</p> <ol style="list-style-type: none"> 1) 10 each A1 rotating assemblies of 6 part numbers. 2) 5 each A2 rotating assemblies of 6 part numbers. 3) 10 each A1 drive assemblies of 7 part numbers. 4) 5 each A2 drive assemblies of 9 part numbers. 5) 10 each A1 calibration source assemblies of 6 part numbers. 6) 5 each A2 calibration source assemblies of 6 part numbers. 7) 10 each of A1 reflector assemblies of 8 part numbers. 8) 5 each of A1 antenna assemblies of 46 part numbers. 9) 5 each A2 antenna assemblies of 51 part numbers. 10) 4 each A2 compensation assemblies of 8 part numbers. <p>SOW Reference Paragraphs: 1.1, 1.2, 2.3(b)(1)(2), 2.5(b)(1)(2), 2.6(b)(1)(2), 2.7(b)(1)(2), 2.8(b)(1)(2) POS Reference Paragraphs: 6.2.6, 6.2.6.1 through 6.2.6.7, 4.5.3 (all), 3.7 (all), 3.5.1 Clarifications to the SOW: Item 33 "Beamwidth Clustering"</p>		

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4 3-3-3	<p>ANTENNA COMPENSATOR FAB - METSAT</p> <p>The A2 Antenna Compensator fabrication and assembly task consists of the fabrication of metal parts required for the compensator assembly, the assembly of those parts and the test of the assembly.</p> <ol style="list-style-type: none"> 1) Fabricate metal parts including motor housings, retainers, dust shields, and covers. 2) Integrate the components into the compensator assembly. 3) Perform compensator assembly tests including bearing friction tests, motor commutation tests and post vibration tests. 4) Provide manufacturing engineering support during the fabrication, integration and test of the compensator assemblies. 5) Provide production control support for the placement and control of the compensator related Requests To Procure. 6) Provide production control for control of all compensator related shop orders. 7) Provide inspection support for all compensator related parts, assemblies and tests. <p>SOW Reference Paragraphs: 1.2, 2.5, 2.6, 2.7, 2.8 GIRD Reference Paragraph: 3.10.5.1.2 GIS Reference Paragraph: 5.0(1.)</p> <p style="text-align: center;">MOVED TO 3.2.2</p>		

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4	3.5.1	<p>RECEIVER TEAM SUPPORT</p> <p>1. <u>Receiver Team Leader</u> - This effort provides for the management of the receiver team. It is largely a continuation of the effort from CWBS 2.2.1, but is focused on post CDR activity, which is manufacturing and test oriented. The team leader is responsible for cost, schedule, manpower, and technical direction. Duties will largely entail the evaluation of the receiver progress, the identification and application of the required resources, and technical direction to all parties participating in the receiver production.</p> <p>Cost and schedule duties will include tracking current team expenditures and accomplishments in relation to planned costs and milestones. This effort includes interaction and meetings with the cost analyst, meetings with management, variance reports, PMS compliance review, etc.</p> <p>Manpower duties will involve the identification of any tasks related to the receiver build (including all documentation) and the subsequent planning and direction of the needed resources to get the job done. This duty also includes the supervision and inspection of the output of any task.</p> <p>The receiver team leader has understanding of the receiver function and is the focal point for technical matters. In this capacity, the team leader will make technical decisions and give advice, based on overall knowledge, team input, analysis, measurement, etc. This includes interface with other teams, support organizations, vendors, Aerojet management, and the customer.</p> <p>2. <u>Cost Analyst</u> - A fiscal analyst will assist and provide accurate and timely information to the receiver team for control of cost and schedule. As part of this effort, the detailed activities will include:</p> <ul style="list-style-type: none"> • Maintain program budgets and work authorization documents. • Coordinate PMS processing, summary, re-planning and data. • Monitor costs/schedule status, corrective actions, and variances. • Preparation of customer cost reports, internal cost reports, data reconciliation, and variance analysis. • Preparation and review of funding requirements. • Maintain the PMS monthly input, support PMS compliance review. • Provide custom analysis for the CAM, Program Office, or customer as needed. 		

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4	3.5.1	<p>3. <u>Procurement Support</u> - A high level of procurement effort is required to support the receiver subcontractors as well as the smaller piece part acquisition. The receiver contains a large quantity of "buy" items that are "state of the art" microwave devices and are high dollar value. Beyond the initial procurement stage, a lot of work is required in the support of SDRL's, MRR's, PDR's, CDR's and other vendor interface. The work will subsequently peak in the initial stages of the program through early 1996, and then taper off as the contracts mature with parts being delivered to Aerojet. The major subcontractors are listed below.</p> <table><tr><td><u>Device</u></td><td><u>Vendor</u></td></tr><tr><td>TCXO</td><td>FEI</td></tr><tr><td>VCGDO</td><td>Litton</td></tr><tr><td>IF BP Filters</td><td>Daden</td></tr><tr><td>Power Dividers</td><td>Daden</td></tr><tr><td>W/G Isolators</td><td>EMS</td></tr><tr><td>W/G Attenuators</td><td>Gamma-f</td></tr><tr><td>DRO</td><td>Litton</td></tr><tr><td>IF Attenuator</td><td>M/A Com</td></tr><tr><td>SAW</td><td>Phonon</td></tr><tr><td>Mixer/IF Amplifiers</td><td>Spacek</td></tr><tr><td>IF Amplifiers</td><td>Amplica</td></tr><tr><td>Hybrid Tee</td><td>MEC</td></tr></table> <p>SOW Ref: para 1.1 - EOS Scope para 1.2 - METSAT Scope para 2.1 - Program Management para 2.2 - Instrument Systems Engineering para 2.3 - EOS Protoflight Model para 2.5 - Metsat Flight Model 3 para 2.6 - Metsat Flight Model 4 para 2.7 - Metsat Flight Model 5 para 2.8 - Metsat Flight Model 6 para 4.4 - PMS Compliance Review</p>			<u>Device</u>	<u>Vendor</u>	TCXO	FEI	VCGDO	Litton	IF BP Filters	Daden	Power Dividers	Daden	W/G Isolators	EMS	W/G Attenuators	Gamma-f	DRO	Litton	IF Attenuator	M/A Com	SAW	Phonon	Mixer/IF Amplifiers	Spacek	IF Amplifiers	Amplica	Hybrid Tee	MEC
<u>Device</u>	<u>Vendor</u>																													
TCXO	FEI																													
VCGDO	Litton																													
IF BP Filters	Daden																													
Power Dividers	Daden																													
W/G Isolators	EMS																													
W/G Attenuators	Gamma-f																													
DRO	Litton																													
IF Attenuator	M/A Com																													
SAW	Phonon																													
Mixer/IF Amplifiers	Spacek																													
IF Amplifiers	Amplica																													
Hybrid Tee	MEC																													

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4	3.5.2	<u>RECEIVER ASSEMBLY FAB - COMMON</u> This effort provides for activities largely related to production and test of deliverable, ready to integrate, receiver shelves (A1-1, A1-2, & A2 units). It also provides for the deliverable CDRL #526, the receiver report (this includes the PLO performance). Most of the activity is related to post CDR efforts for the receiver shelves and the PLO production. Additional efforts accounted for in this element include continuation of support for the weekly/monthly reports, monthly/quarterly reviews, special test equipment production, and rework/anomaly resolution. 1. <u>Shop Orders, MAI, MPI, & RTP</u> - This effort provides for the review and updating of all required manufacturing planning documents including the complete shop order package. This package includes the shop order, manufacturing assembly instructions (MAI's), and manufacturing process instructions (MPI's) for each make item related to the receiver shelves and PLO (phased locked oscillator). It also includes the effort to initiate the required (RTP) requests to purchase for each of the purchased line items. Output is 95 shop orders. 2. <u>Special Handling Equipment</u> - This task provides for the review and design/fab/purchase and implementation of additional special handling equipment to preclude damage to the costly and sensitive assemblies. 3. <u>Common Production Control</u> - This task provides for the opening and closing of each shop order required for each make item and the request and release of each kit. 4. <u>Shelf & PLO Fabrication</u> - This effort provides for the machine shop fabrication of all required mechanical make items for the receiver shelves and the PLO. Supporting this effort is a Shop Floor Control (SFC) Clerk, Inspection, and Manufacturing Engineering. 5. <u>Shelf & PLO Assembly</u> - This work provides for the assembly of all required electronic and electromechanical make items for the receiver and the PLO. Supporting this effort is Inspection, Manufacturing Engineering, and Supervision.		

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4	3.5.2	<p>6. <u>PLO Environmental Testing</u> - The PLO will undergo a number of qualification tests after various environmental exposures to insure quality of the product. All PLO units will be thermal vacuum tested at qualification levels. The qualification PLO units will also be exposed to three axis of vibration at the qualification (19.96 Gms) overall acceleration spectral density.</p> <p>7. <u>Receiver and PLO Electrical Performance Tests</u> - Each PLO and receiver shelf must be electrically tested for compliance with the specification (ATP). The PLO test procedure (AE TBD), which is based on AE-26633, will be used to verify PLO performance. The receiver test procedure (AE-26002/6), which is based on AE-26608, will be used to verify Receiver performance.</p> <p>8. <u>Receiver Shelf Frequency & Power Adjustments</u> - A number of measurements and adjustments must be made during the assembly of the receiver shelves. This effort provides for engineering support of this activity during the receiver shelf assembly.</p> <p>9. <u>PLO and Receiver Rework</u> - This effort provides for the rework of electronic and mechanical make items for the PLO and receiver shelves. Supporting this effort is Inspection, Manufacturing Engineering, and Supervision. Engineering support is included in this package to cover engineering rework (anomaly analysis, reports, & supervision of hardware rework).</p> <p>10. <u>Periodic Reports & Meetings</u> - The work is a continuation of the same effort provided in CWBS 2.2.2., but is focused on the post CDR production period. The weekly report (CDRL #521) and the monthly report (CDRL #529) will be generated each week/month for the receiver team effort. This will include all research, analysis, and actual generation of the physical document to be delivered to the program office and integrated into the overall system report. The subject matter will include all receiver and PLO activity for the time period indicated. The receiver team will support the corresponding section of the quarterly review. This presentation will include engineering and manufacturing accomplishments for the previous 3 months. The subject matter will cover technical, cost, manpower, and PMS performance and will include a 9 month forecast.</p>	

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4	3.5.2	<p>11. <u>Team Meetings, Team Communication</u> - The work is a continuation of the same effort provided in CWBS 2.2.2., but is focused on the post CDR production period. Weekly team meetings will be held where all the core and satellite receiver team members will communicate to establish status, problems, priorities, and direction. This process assures coordinated and efficient effort between all team members.</p> <p>12. <u>Subcontractor Interface During Travel</u> - This work provides for interface of the receiver engineering personnel with the major subcontractors of the receiver and PLO. This interface will largely be in the form of formal meetings such as the PDR, CDR, MRR, and fact finding. A few technical interchange meetings will also be provided for as required. A few key vendors, such as Litton, will have weekly visits by engineering until a key milestone is satisfied, such as CDR.</p> <p>13. <u>Receiver Test Equipment Fabrication</u> - This effort provides for the actual fabrication of the receiver test equipment as designed and purchased in CWBS 2.2.2. The work will entail the actual fabrication of one each Receiver Test Set for the A1-1, A1-2, and A2 receiver shelves, in addition to 7 detector pre-amp test boxes.</p> <p>14. <u>Critical Vendor Interface</u> - This effort provides for extra interface for critical vendors such as Litton and Spacek. It gives the extra communication needed to maintain schedule and technical performance. This work covers written and verbal communication and does not include interface while traveling.</p> <p>15. <u>Mechanical Drafting</u> - Prepare ECN's for receiver components as required. Incorporate into drawings, check drawings, and release.</p>		

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4	3.5.2	<p>16. <u>ECN Incorporation</u> - Prepare and submit ECN's as required and incorporate into production receiver hardware. The efforts supported are : shop order preparation, bill of material correction in MRP, provision of new S.O. routings, production control support, ECN hardware incorporation, touch labor, inspection, and receiver engineering support.</p> <p>SOW Ref:</p> <ul style="list-style-type: none"> para 1.1 - EOS Scope para 1.2 - METSAT Scope para 2.1.3 - Reporting Requirements para 2.3 - EOS Protoflight Model para 2.5 - Metsat Flight Model 3 para 2.6 - Metsat Flight Model 4 para 2.7 - Metsat Flight Model 5 para 2.8 - Metsat Flight Model 6 para 3.0 - Required Plans and Other Documents para 4.18 - Monthly Status Meetings para 4.3 - Quarterly Status Review <p>17. <u>Receiver Reports - EOS</u></p> <p>Generate Receiver Shelf Reports for the A1-1, A1-2, and A2 Receiver Shelves for the EOS unit. This report includes sub-contractor ATP data on components, analysis, summary, and description of the performance. This report also includes results of the in-house receiver shelf sub-assembly Atp for three shelves and the PLO.</p>	

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4	3.7.1	<p><u>INTEGRATION AND TEST - TEAM SUPPORT</u></p> <p>As required, in the Statement of Work sec. 2.1, 2.2, 2.9; provide technical direction/management and general systems engineering coordination for the AMSU-A instrument integration and test. It includes cost, schedule, and manpower management. The task will be performed by a lead systems engineer and a fiscal analyst. The lead system engineer is responsible for providing technical direction, making technical decisions, planning and executing the tasks related to the system integration and test. It also includes the supervision and inspection of the output of the task. Cost and schedule duties will involve tracing current team expenditures and accomplishments in relation to planned costs and milestones. A fiscal analyst will assist and provide all necessary data to the lead systems engineer for cost control and tracking. The lead systems engineer is the technical team leader and is the focal point for all technical matters pertaining to the system integration and test. In this capacity the lead systems engineer will perform above described tasks and interfaces with the customer, program office, all team members (responsible for performing the system integration and test tasks), management and other AMSU-A teams. Additionally, the lead system engineer will provide management of GSE task.</p> <p>The following task will be managed by the lead system engineer under the W.B.S. 3.7.1</p> <p>a) Sys. Engineering Common WBS 2.1.6 e) Sys Engineering EOS Unique WBS 2.1.7 b) Sys. Plans & Specifications WBS 2.1.2 f) Sys. Engineering METSAT Unique WBS 2.1.8 c) EOS S/C Interface WBS 2.1.4 g) GSE & Fixtures WBS 10.0 d) METSAT S/C Interface WBS 2.1.5 h) Configuration Mgmt and Data Mgmt</p> <p>Applicable specifications are: S-480-79, S-480-80, GHS-3267415, UHS-2617547, UHS-2624483.</p> <p>Output will be management of technical, schedule (WBS 2.1) and cost of AMSU-A system engineering, integration and test tracks (WBS 3.7). Management of technical, schedule, and cost of AMSU-A GSE task (WBS 10.0).</p> <p>Excluded from this element is material and travel cost.</p>		

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4 3.7.2	<p>INTEGRATION & TEST PFM - EOS As required, in the Statement of Work sec. 1.1, 2.2, 2.3, 2.9, 3.0, 4.12, 4.15; provide support through all levels of integration and test, pre-environmental review, calibration, installation into shipping container, pre-ship review, and to develop and provide calibration log book, trend data, and analysis. Failure/anomaly, description and resolution plans will also be addressed. For EOS PFM, specific work included is as follows:</p> <ol style="list-style-type: none"> 1. Provide system engineering interface to subsystem engineering for successful integration of subsystems into an AMSU-A instrument. 2. Provide support to environmental engineering by early planning and coordination. Teams to be involved are Environmental Engineering, Instrument Engineering, and the GSE team. 3. Integration and test shop orders for both the A1 & A2 units will be reviewed and edited (redlined) as necessary. 4. The subassemblies associated with A1 instrument will be integrated using the "Safe-To-Mate" procedure incorporated into AE26156/7 (WBS 2.1.7). Included in the integration process is Antenna Drive test, LO Frequency and IF test, PRT Test & Calibration, Engineering Evaluation Comprehensive Performance Test and Formal Comprehensive Performance Test at room ambient temperatures. Generation of an Antenna Drive Test Report will also be done. Problems or anomalies will be resolved during integration. 5. The A2 instrument will also be integrated as described in item 5 except use Integration and Test procedure will be AE26156/8. 6. A Pre-Environmental Review (PER) meeting will be held prior to subjecting the A1 or A2 instruments to environmental test (per. CDRL 029). During the PER, data will be presented from these test areas: System Level, Antenna Subsystem, RCVR Subsystem, and Electronics Subsystem. Also, Preliminary Performance Verification Matrix and Trend analysis will be presented (CDRL 222 & 215 respectively). 7. A review of the Acceptance Test Shop Order for both the A1 & A2 unit will be performed. Redline and incorporate work around if necessary. 		

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4 3.7.2	<p><u>INTEGRATION & TEST PFM - EOS (Continued)</u></p> <p>8. An EMI/RFI and Magnetic Field Test will be performed per the latest Aerojet test procedure AE26151/X (ref. WBS 2.1.7) for both the A1 & A2 instruments. At the conclusion of this test a report will be generated for documentation and reference.</p> <p>9. A Vibration and Acceleration Test will be performed per the latest Aerojet test procedure AE26151/X (ref. WBS 2.1.7) for both the A1 & A2 instruments. Included in this test is a review of the prevailing Vibration and Acceleration shop order (revise if required), perform a Test Readiness Review (TRR), Mass Sim. dry run, and Ground Fault Isolation Test Setup. System engineering will perform a Sub-Comprehensive Performance Test (Sub-CPT) per AE26156/9 or /10 after testing of each instrument axis. Post test task include data reduction, analysis and report generation by mechanical or environmental or systems engineering.</p> <p>10. A Thermal Vacuum Calibration test will be performed using the latest Aerojet test procedure AE26156/11 or /12 (ref. WBS 2.1.7) for both the A1 & A2 instruments. Also, only one Thermal Balance test per procedure AE26151/2 will be performed. Included in this test is a review of the prevailing shop order (revise if required), perform a Test Readiness Review (TRR), construction/development of a Thermal Balance Model, chamber dry-run to validate chamber readiness, instrument & Calibration Test Equipment (CTE) setup and break down, and trend analysis during portions of test. A Final Comprehensive Performance Test will be done at the conclusion of Thermal/Vacuum activities. Post test activities include analysis of data for Thermal Balance portion of test Calibration and report generation for these areas.</p> <p>11. A Thermal Vacuum Cycle test will be performed using the Aerojet test procedure AE-20151/9 for both A1 & A2 per attached scenario. The scenario as been approved by NASA during fact finding meeting.</p> <p>12. Using the latest AE 26151/X test procedure, perform a Weight and C.G. test. Included in this test is a Test Readiness Review (TRR), and generation of a report.</p> <p>13. Perform a Pre-Ship Review (PSR) for both A1 and A2 instruments (CDRL 032). Included in this segment is generation of the final Performance Matrix (CDRL 222), final Trend Analysis, Acceptance Data Package, and Calibration Log Book Reports (CDRL 404 Final) for the appropriate instrument and CDRL 405 EOS general operating command procedure.</p>		

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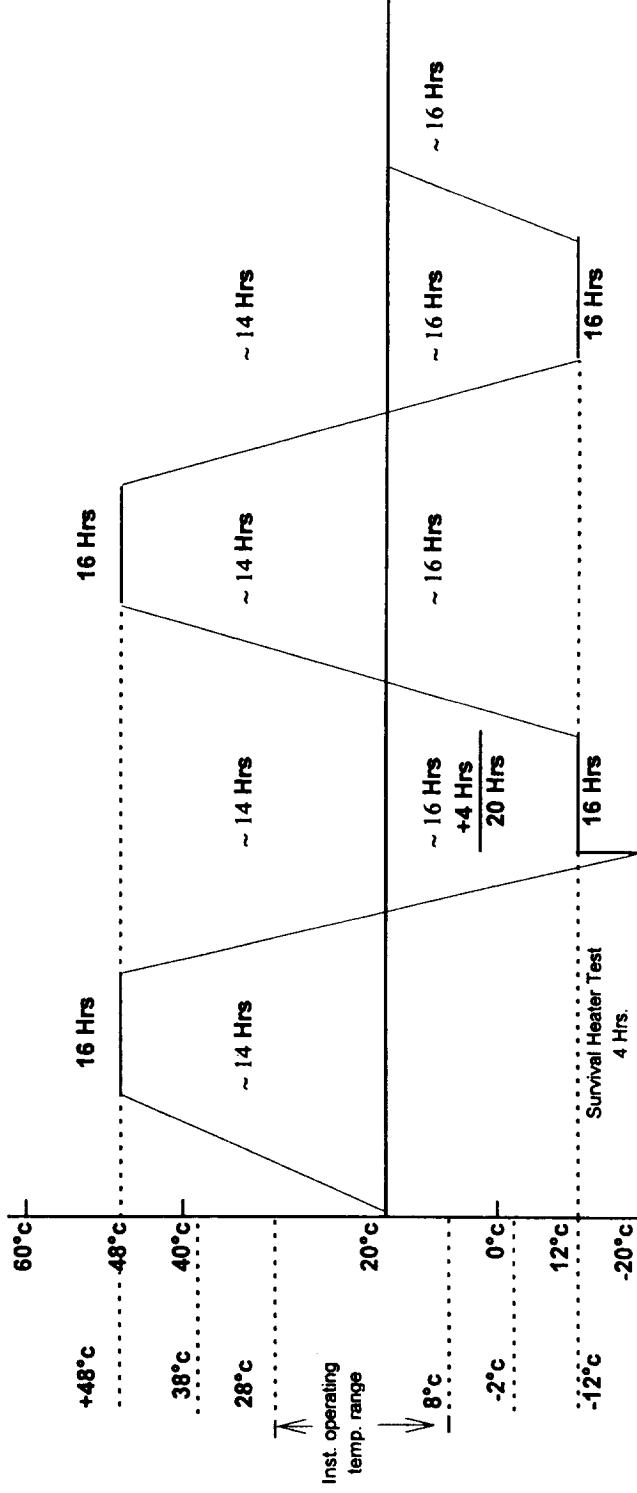
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4	3.7.2	<p>INTEGRATION & TEST PFM - EOS (Continued)</p> <p>14. Installed instruments into shipping containers using the latest version of Handling Procedure document AE26357. Included in this task is extensive cleaning of container.</p> <p>15. Anomaly analysis and resolution for both instruments is included in this element. Generation of reports, if appropriate, will be done</p> <p>16. Included in this element is contamination control and cleaning. Provisions for this task include support for process instructions, witness sample preparation and analysis, Temperature Controlled Quartz Crystal Microbalance (TQCM) evaluation and analysis, instrument cleaning and verification of, and generation of related reports.</p> <p>Applicable specifications are S-480-80, S-480-79, GIRD-422-11-12-0, UHS-422-12-12-02, CDRL 032, 029, 215, 222, 256, and various Aerojet procedures and specifications as indicated within the previous text of this element. Also reference letter "Integrated AMSU-A Technical Clarifications and Requirements" sent to the attention of Ms. Nancy Faman Lockard on 19 Sept. 95.</p> <p>Output will be flight ready AMSU-A1 and AMSU-A2 instruments that have been integrated and verified/ demonstrated in detail that performance requirements are within allowable tolerances per all the required NASA specifications. For A1 and A2 instruments accomplish PER & PSR; provide calibration log books, trend analysis, performance verification matrix providing summary of the performance and ensures instruments met mission requirements, provide acceptance data package related to instrument testing and generation of reports specific to imbedded testing during implementation of this element.</p> <p>Excluded from this element is cost for material, travel, document processes such as, reproduction, publication, and distribution/shipping.</p> <p>Excluded from this element is cost for signal processor test at system level.</p> <p>Excluded from this element is RF coax cable material and conditioning and testing of the cable. The cost of this task and material is in RCVR account.</p> <p>Included is cost for liquid nitrogen (LN2), material and equipment for momentum compensation test, supplies for use in dealing with ECN incorporation, and instrument cleaning supplies.</p>		

AMSU-A TV CYCLE SCENARIO

THERMAL VACUUM CYCLE PROFILE For AMSU-A1

- +8°C to +25°C Inst. worst case in-orbit operating temp. range
- 2°C to +38°C Inst. calibration range
- 12°C to +48°C Inst. thermal cycle range

TOTAL OF TWO CYCLES



AMSU-A2 T/V CYCLE SCENARIO

ATTACHMENT 2

Thermal vacuum cycle profile for AMSU-A2. Same as AMSU-A (Refer to W.P. #16), but the temperature ranges are as follows:

- +3 c to + 20 c Inst. worst case in-orbit operating temperature range
- 7 c to +30 c Inst. calibration temperature range
- 12 c to 48 c Inst. thermal cycle range

Total of two cycles

Thermal vacuum cycle will be +10 c & -10 c above and beyond inst. calibration temperature range

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4	3.7.3	<p>INTEGRATION & TEST FM3</p> <p>As required, in the Statement of Work sec. 1.2, 2.2, 2.5, 2.10, 3.0, 4.12, 4.15; provide support through all levels of integration and test, pre-environmental review, calibration, installation into shipping container, pre-ship review, and to develop and provide calibration log book, trend data, and analysis. Failure/anomaly, description and resolution plans will also be addressed. For FM-3, the specific work included is as follows:</p> <ol style="list-style-type: none">1. Provide system engineering interface to subsystem engineering for successful integration of subsystems into an AMSU-A instrument.2. Perform troubleshooting, drafting, ECR preparation, IR resolution, FAR support, stress analysis support and specification support related to mechanical / packaging aspect of the integration of all subassemblies into an instrument. This task includes review of Shop Orders and Shop Order changes.*3. Provide support to environmental engineering by early planning and coordination. Teams to be involved are Environmental Engineering, Instrument Engineering, and the GSE team.4. Integration and test shop orders for both the A1 & A2 units will be reviewed and edited (redlined) as necessary.5. The subassemblies associated with A1 instrument will be integrated using the "Safe-To-Mate" procedure incorporated into AE26156/1 (WBS 2.1.2). Included in the integration process is Antenna Drive test, LO Frequency and IF test, PRT Test & Calibration, Engineering Evaluation Comprehensive Performance Test and Formal Comprehensive Performance Test at room ambient temperatures. Generation of an Antenna Drive Test Report will also be done. Problems or anomalies will be resolved during integration.6. The A2 instrument will also be integrated as described in item 5 except the Integration and Test procedure will be AE26156/2.7. A Pre-Environmental Review (PER) meeting will be held prior to subjecting the A1 or A2 instruments to environmental test (per. CDRL 029). During the PER, data will be presented from these test areas: System Level, Antenna Subsystem, RCVR Subsystem, and Electronics Subsystem. Also, Preliminary Performance Verification Matrix and Trend analysis will be presented (CDRL 222 & 215 respectively). <p>* Refer to 4510-03-7350</p>		

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4 3.7.3	<p><u>INTEGRATION & TEST FM3 (Continued)</u></p> <p>8. A review of the Acceptance Test Shop Order for both the A1 & A2 unit will be performed. Redline and incorporate work around if necessary.</p> <p>9. An EMI/RFI and Magnetic Field Test will be performed per the latest Aerojet test procedure AE26151/5 (ref. WBS 2.1.2) for both the A1 & A2 instruments. At the conclusion of this test a report will be generated for documentation and reference.</p> <p>10. A Vibration and Acceleration Test will be performed per the latest Aerojet test procedure AE26151/1 (ref. WBS 2.1.2) for both the A1 & A2 instruments. Included in this test is a review of the prevailing Vibration and Acceleration shop order (revise if required), perform a Test Readiness Review (TRR), Mass Sim. dry run, and Ground Fault Isolation Test Setup. System engineering will perform a Sub-Comprehensive Performance Test (Sub-CPT) per AE26156/3 or /4 after testing of each instrument axis. Post test task include data reduction, analysis, and report generation by mechanical or environmental or systems engineering.</p> <p>11. A Room Ambient Pressure Thermal Cycle test will be performed using the latest Aerojet test procedure AE26151/7 (ref. WBS 2.1.2) for both the A1 & A2 instruments. Included in this test is a review of the prevailing Thermal cycle Test shop order (revise if required), perform a Test Readiness Review (TRR), perform a dry run to validate chamber readiness, and survival heater activation. System engineering will perform a Sub-Comprehensive Performance Test (Sub-CPT) per AE26156/3 or /4 after the Thermal Cycle test. Post test task include data reduction and trend data analysis.</p> <p>12. A Thermal/Vacuum Calibration test will be performed using the latest Aerojet test procedure AE26156/5 or /6 (ref. WBS 2.1.2) for both the A1 & A2 instruments. Also, only one Thermal Balance test per procedure AE26151/2 will be performed. Included in this test is a review of the prevailing shop order (revise if required), perform a Test Readiness Review (TRR), construction/development of a Thermal Balance Model, chamber dry-run to validate chamber readiness, instrument & Calibration Test Equipment (CTE) setup and break down, and trend analysis during portions of test. A Final Comprehensive Performance Test will be done at the conclusion of Thermal/Vacuum activities. Post test activities include analysis of data for Thermal Balance portion of test, calibration, and report generation for these areas.</p>		

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4	3.7.3		
	INTEGRATION & TEST FM3 (Continued) 13. A Momentum Compensation test will be performed on the A1 and A2 instrument using procedure developed in WBS 2.1.2 Included in this test is a review of the prevailing shop order (revise if required), perform a Test Readiness Review (TRR), and a Dry Run. Post test task include analysis and generation of a report. 14. Using the latest AE 26151/3 test procedure, perform a Weight and C.G. test. Included in this test is a Test Readiness Review (TRR), and generation of a report. 15. Perform a Pre-Ship Review (PSR) for both A1 and A2 instruments (CDRL 032). Included in this segment is generation of the final Performance Matrix (CDRL 222), final Trend Analysis, Acceptance Data Package, and Calibration Log Book Reports for the appropriate instrument. 16. Installed instruments into shipping containers using the latest version of Handling Procedure document AE26357. Included in this task is extensive cleaning of container. 17. Anomaly analysis and resolution for both instruments is included in this element. Generation of reports, if appropriate, will be done. 18. Incorporation of ECNs developed during the course of implementing this element will be done.* Applicable specifications are S-480-80, S-480-79, GHS-3267415, UHS-2617547, UHS-2624483, CDRL 032, 029, 215, 222, 256, and various Aerojet procedures and specifications as indicated within the previous text of this element. Also reference letter "Integrated AMSU-A Technical Clarifications and Requirements" sent to the attention of Ms. Nancy Faman Lockard on 19 Sept. 95. Output will be flight ready AMSU-A1 and AMSU-A2 instruments that have been integrated and verified/ demonstrated in detail that performance requirements are within allowable tolerances per all the required NASA specifications. For A1 and A2 instruments accomplish PER & PSR; provide calibration log books, trend analysis, performance verification matrix providing summary of the performance and ensures instruments met mission requirements, provide acceptance data package related to instrument testing and generation of reports specific to imbedded testing during implementation of this element.		
	* Refer to 4510-03-7350		

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4 3.7.3	INTEGRATION & TEST FM3 (Continued) Excluded from this element is cost for material, travel, document processes such as, reproduction, publication, and distribution/shipping. Excluded from this element is cost for signal processor test at system level. Excluded from this element is RF coax cable material and conditioning and testing fo the cable. The cost of this task and material is in RCVR account. Included is cost for liquid nitrogen (LN2), material and equipment for momentum compensation test, and supplies for use in dealing with ECN incorporation.		

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4 3.7.4		INTEGRATION & TEST FM 4 As required, in the Statement of Work sec. 1.2, 2.2, 2.6, 2.10, 3.0, 4.12, 4.15; provide support through all levels of integration and test, pre-environmental review, calibration, installation into shipping container, pre-ship review, and to develop and provide calibration log book, trend data, and analysis. Failure/anomaly, description and resolution plans will also be addressed. For FM-4, the specific work included is as follows:		
		<ol style="list-style-type: none">1. Provide system engineering interface to subsystem engineering for successful integration of subsystems into an AMSU-A instrument.2. Perform troubleshooting, drafting, ECR preparation, IR resolution, FAR support, stress analysis support and specification support related to mechanical / packaging aspect of the integration of all subassemblies into an instrument. This task includes review of Shop Orders and Shop Order changes.*3. Provide support to environmental engineering by early planning and coordination. Teams to be involved are Environmental Engineering, Instrument Engineering, and the GSE team.4. Integration and test shop orders for both the A1 & A2 units will be reviewed and edited (redlined) as necessary.5. The subassemblies associated with A1 instrument will be integrated using the "Safe-To-Mate" procedure incorporated into AE26156/1 (WBS 2.1.2). Included in the integration process is Antenna Drive test, LO Frequency and IF test, PRT Test & Calibration, Engineering Evaluation Comprehensive Performance Test and Formal Comprehensive Performance Test at room ambient temperatures. Generation of an Antenna Drive Test Report will also be done. Problems or anomalies will be resolved during integration.6. The A2 instrument will also be integrated as described in item 5 except the Integration and Test procedure will be AE26156/2.7. A Pre-Environmental Review (PER) meeting will be held prior to subjecting the A1 or A2 instruments to environmental test (per. CDRL 029). During the PER, data will be presented from these test areas: System Level, Antenna Subsystem, RCVR Subsystem, and Electronics Subsystem. Also, Preliminary Performance Verification Matrix and Trend analysis will be presented (CDRL 222 & 215 respectively).		
		*Refer to 4510-03-7450		

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4 3.7.4	<p><u>INTEGRATION & TEST FM4 (Continued)</u></p> <p>8. A review of the Acceptance Test Shop Order for both the A1 & A2 unit will be performed. Redline and incorporate work arounds if necessary.</p> <p>9. For the EMI/RF Test, only SAR frequency will be tested per the latest Aerojet test procedure AE26151/5 (ref. WBS 2.1.2) for both the A1 & A2 instruments. At the conclusion of this test a report will be generated for documentation and reference.</p> <p>10. A Vibration and Acceleration Test will be performed per the latest Aerojet test procedure AE26151/1 (ref. WBS 2.1.2) for both the A1 & A2 instruments. Included in this test is a review of the prevailing Vibration and Acceleration shop order (revise if required), perform a Test Readiness Review (TRR), Mass Sim. dry run, and Ground Fault Isolation Test Setup. System engineering will perform a Sub-Comprehensive Performance Test (Sub-CPT) per AE26156/3 or /4 after testing of each instrument axis. Post test task include data reduction, analysis, and report generation by mechanical or environmental or systems engineering.</p> <p>11. A Room Ambient Pressure Thermal Cycle test will be performed using the latest Aerojet test procedure AE26151/7 (ref. WBS 2.1.2) for both the A1 & A2 instruments. Included in this test is a review of the prevailing Thermal cycle Test shop order (revise if required), perform a Test Readiness Review (TRR), perform a dry run to validate chamber readiness, and survival heater activation. System engineering will perform a Sub-Comprehensive Performance Test (Sub-CPT) per AE26156/3 or /4 after the Thermal Cycle test. Post test task include data reduction and trend data analysis.</p> <p>12. A Thermal/Vacuum Calibration test will be performed using the latest Aerojet test procedure AE26156/5 or /6 (ref. WBS 2.1.2) for the respective A1 & A2 instruments. Included in this test is a review of the prevailing shop order (revise if required), perform a Test Readiness Review (TRR), chamber dry-run to validate chamber readiness, instrument & Calibration Test Equipment (CTE) setup and break down, STE setup and database verification, and trend analysis during portions of test. A Final Comprehensive Performance Test will be done at the conclusion of Thermal/Vacuum activities. Post test activities include analysis of data for calibration, and report generation.</p>		

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4 3.7.4	<p>INTEGRATION & TEST FM 4 (Continued)</p> <p>13. A Momentum Compensation test will be performed on the A2 instrument using procedure developed in WBS 2.12. Included in this test is a review of the prevailing shop order (revise if required), perform a Test Readiness Review (TRR), and a Dry Run. Post test task include analysis and generation of a report.</p> <p>14. Using the latest AE 26151/3 test procedure, perform a Weight and C.G. test. Included in this test is a Test Readiness Review (TRR), and generation of a report.</p> <p>15. Perform a Pre-Ship Review (PSR) for both A1 and A2 instruments (CDRL 032). Included in this segment is generation of the final Performance Matrix (CDRL 222), final Trend Analysis, Acceptance Data Package, and Calibration Log Book Reports for the appropriate instrument.</p> <p>16. Installed instruments into shipping containers using the latest version of Handling Procedure document AE26357. Included in this task is extensive cleaning of container.</p> <p>17. Anomaly analysis and resolution for both instruments is included in this element. Generation of reports, if appropriate, will be done.</p> <p>18. Incorporation of ECNs developed during the course of implementing this element will be done.*</p> <p>Applicable specifications are S-480-80, S-480-79, GHS-3267415, UHS-2617547, UHS-2624483, CDRL 032, 029, 215, 222, 256, and various Aerojet procedures and specifications as indicated within the previous text of this element. Also reference letter "Integrated AMSU-A Technical Clarifications and Requirements" sent to the attention of Ms. Nancy Faman Lockard on 19 Sept. 95.</p> <p>Output will be flight ready AMSU-A1 and AMSU-A2 instruments that have been integrated and verified/ demonstrated in detail that performance requirements are within allowable tolerances per all the required NASA specifications. For A1 and A2 instruments accomplish PER & PSR; provide calibration log books, trend analysis, performance verification matrix providing summary of the performance and ensures instruments met mission requirements, provide acceptance data package related to instrument testing and generation of reports specific to imbedded testing during implementation of this element.</p>		
	*Refer to 4510-03-7450		

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4	3.7.4	<p><u>INTEGRATION & TEST FM 4 (Continued)</u></p> <p>Excluded from this element is cost for material, travel, document processes such as, reproduction, publication, and distribution/shipping.</p> <p>Excluded from this element is cost for signal processor test at system level.</p> <p>Excluded from this element is RF coax cable material and conditioning and testing of the cable. The cost of this task and material is in RCVR account.</p> <p>Included is cost for liquid nitrogen (LN2) and supplies for use in dealing with ECN incorporation.</p>		

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4 3.7.5	<p>INTEGRATION & TEST FM5</p> <p>As required, in the Statement of Work sec. 1.2, 2.2, 2.7, 2.10, 3.0, 4.12, 4.15; provide support through all levels of integration and test, pre-environmental review, calibration, installation into shipping container, pre-ship review, and to develop and provide calibration log book, trend data, and analysis. Failure/anomaly, description and resolution plans will also be addressed. For FM-5, the specific work included is as follows:</p> <ol style="list-style-type: none"> 1. Provide system engineering interface to subsystem engineering for successful integration of subsystems into an AMSU-A instrument. 2. Perform troubleshooting, drafting, ECR preparation, IR resolution, FAR support, stress analysis support and specification support related to mechanical / packaging aspect of the integration of all subassemblies into an instrument. This task includes review of Shop Orders and Shop Order changes.* 3. Provide support to environmental engineering by early planning and coordination. Teams to be involved are Environmental Engineering, Instrument Engineering, and the GSE team. 4. Integration and test shop orders for both the A1 & A2 units will be reviewed and edited (redlined) as necessary. 5. The subassemblies associated with A1 instrument will be integrated using the "Safe-To-Mate" procedure incorporated into AE26156/1 (WBS 2.1.2). Included in the integration process is Antenna Drive test, LO Frequency and IF test, PRT Test & Calibration, Engineering Evaluation Comprehensive Performance Test and Formal Comprehensive Performance Test at room ambient temperatures. Generation of an Antenna Drive Test Report will also be done. Problems or anomalies will be resolved during integration. 6. The A2 instrument will also be integrated as described in item 5 except the Integration and Test procedure will be AE26156/2. 7. A Pre-Environmental Review (PER) meeting will be held prior to subjecting the A1 or A2 instruments to environmental test (per. CDRL 029). During the PER, data will be presented from these test areas: System Level, Antenna Subsystem, RCVR Subsystem, and Electronics Subsystem. Also, Preliminary Performance Verification Matrix and Trend analysis will be presented (CDRL 222 & 215 respectively). 		

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4 3.7.5	<p>INTEGRATION & TEST FM5 (Continued)</p> <p>8. A review of the Acceptance Test Shop Order for both the A1 & A2 unit will be performed. Redline and incorporate work around if necessary.</p> <p>9. For the EMI/RF Test, only SAR frequency will be tested per the latest Aerojet test procedure AE26151/5 (ref. WBS 2.1.2) for both the A1 & A2 instruments. At the conclusion of this test a report will be generated for documentation and reference.</p> <p>10. A Vibration and Acceleration Test will be performed per the latest Aerojet test procedure AE26151/1 (ref. WBS 2.1.2) for both the A1 & A2 instruments. Included in this test is a review of the prevailing Vibration and Acceleration shop order (revise if required), perform a Test Readiness Review (TRR), Mass Sim. dry run, and Ground Fault Isolation Test Setup. System engineering will perform a Sub-Comprehensive Performance Test (Sub-CPT) per AE26156/3 or /4 after testing of each instrument axis. Post test task include data reduction, analysis, and report generation by mechanical or environmental or systems engineering.</p> <p>11. A Room Ambient Pressure Thermal Cycle test will be performed using the latest Aerojet test procedure AE26151/7 (ref. WBS 2.1.2) for both the A1 & A2 instruments. Included in this test is a review of the prevailing Thermal cycle Test shop order (revise if required), perform a Test Readiness Review (TRR), perform a dry run to validate chamber readiness, and survival heater activation. System engineering will perform a Sub-Comprehensive Performance Test (Sub-CPT) per AE26156/3 or /4 after the Thermal Cycle test. Post test task include data reduction and trend data analysis.</p> <p>12. A Thermal/Vacuum Calibration test will be performed using the latest Aerojet test procedure AE26156/5 or /6 (ref. WBS 2.1.2) for the respective A1 & A2 instruments. Included in this test is a review of the prevailing shop order (revise if required), perform a Test Readiness Review (TRR), chamber dry-run to validate chamber readiness, instrument & Calibration Test Equipment (CTE) setup and break down, STE setup and database verification, and trend analysis during portions of test. A Final Comprehensive Performance Test will be done at the conclusion of Thermal/Vacuum activities. Post test activities include analysis of data for calibration, and report generation.</p>		

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4 3.7.5	INTEGRATION & TEST FM 5 (Continued) 13. A Momentum Compensation test will be performed on the A2 instrument using procedure developed in WBS 2.12. Included in this test is a review of the prevailing shop order (revise if required), perform a Test Readiness Review (TRR), and a Dry Run. Post test task include analysis and generation of a report. 14. Using the latest AE 26151/3 test procedure, perform a Weight and C.G. test. Included in this test is a Test Readiness Review (TRR), and generation of a report. 15. Perform a Pre-Ship Review (PSR) for both A1 and A2 instruments (CDRL 032). Included in this segment is generation of the final Performance Matrix (CDRL 222), final Trend Analysis, Acceptance Data Package, and Calibration Log Book Reports for the appropriate instrument. 16. Installed instruments into shipping containers using the latest version of Handling Procedure document AE26357. Included in this task is extensive cleaning of container. 17. Anomaly analysis and resolution for both instruments is included in this element. Generation of reports, if appropriate, will be done. 18. Incorporation of ECNs developed during the course of implementing this element will be done.* Applicable specifications are S-480-80, S-480-79, GHS-3267415, UHS-2617547, UHS-2624483, CDRL 032, 029, 215, 222, 256, and various Aerojet procedures and specifications as indicated within the previous text of this element. Also reference letter "Integrated AMSU-A Technical Clarifications and Requirements" sent to the attention of Ms. Nancy Farnan Lockard on 19 Sept. 95. Output will be flight ready AMSU-A1 and AMSU-A2 instruments that have been integrated and verified/ demonstrated in detail that performance requirements are within allowable tolerances per all the required NASA specifications. For A1 and A2 instruments accomplish PER & PSR; provide calibration log books, trend analysis, performance verification matrix providing summary of the performance and ensures instruments met mission requirements, provide acceptance data package related to instrument testing and generation of reports specific to imbedded testing during implementation of this element.		
	*Refer to 4510-03-7550		

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4	3.7.5	INTEGRATION & TEST FM6 (Continued) Excluded from this element is cost for material, travel, document processes such as, reproduction, publication, and distribution/shipping. Excluded from this element is cost for signal processor test at system level. Excluded from this element is RF coax cable material and conditioning and testing of the cable. The cost of this task and material is in RCVR account. Included is cost for liquid nitrogen (LN2) and supplies for use in dealing with ECN incorporation.		

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4 3.7.6	<p>INTEGRATION & TEST FM6</p> <p>As required, in the Statement of Work sec. 1.2, 2.2, 2.8, 2.10, 3.0, 4.12, 4.15; provide support through all levels of integration and test, pre-environmental review, calibration, installation into shipping container, pre-ship review, and to develop and provide calibration log book, trend data, and analysis. Failure/anomaly, description and resolution plans will also be addressed. For FM-6, the specific work included is as follows:</p> <ol style="list-style-type: none">1. Provide system engineering interface to subsystem engineering for successful integration of subsystems into an AMSU-A instrument.2. Perform troubleshooting, drafting, ECR preparation, IR resolution, FAR support, stress analysis support and specification support related to mechanical / packaging aspect of the integration of all subassemblies into an instrument. This task includes review of Shop Orders and Shop Order changes.*3. Provide support to environmental engineering by early planning and coordination. Teams to be involved are Environmental Engineering, Instrument Engineering, and the GSE team.4. Integration and test shop orders for both the A1 & A2 units will be reviewed and edited (redlined) as necessary.5. The subassemblies associated with A1 instrument will be integrated using the "Safe-To-Mate" procedure incorporated into AE26156/1 (WBS 2.1.2). Included in the integration process is Antenna Drive test, LO Frequency and IF test, PRT Test & Calibration, Engineering Evaluation Comprehensive Performance Test and Formal Comprehensive Performance Test at room ambient temperatures. Generation of an Antenna Drive Test Report will also be done. Problems or anomalies will be resolved during Integration.6. The A2 instrument will also be integrated as described in item 5 except the Integration and Test procedure will be AE26156/2.7. A Pre-Environmental Review (PER) meeting will be held prior to subjecting the A1 or A2 instruments to environmental test (per. CDRL 029). During the PER, data will be presented from these test areas: System Level, Antenna Subsystem, RCVR Subsystem, and Electronics Subsystem. Also, Preliminary Performance Verification Matrix and Trend analysis will be presented (CDRL 222 & 215 respectively).		
*Refer to 4510-03-7650			

*Refer to 4510-03-7650

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4	INTEGRATION & TEST FM6 - (Continued)		
3.7.6	<p>8. A review of the Acceptance Test Shop Order for both the A1 & A2 unit will be performed. Redline and incorporate work around if necessary.</p> <p>9. For the EMI/RF Test, only SAR frequency will be tested per the latest Aerojet test procedure AE26151/5 (ref. WBS 2.1.2) for both the A1 & A2 instruments. At the conclusion of this test a report will be generated for documentation and reference.</p> <p>10. A Vibration and Acceleration Test will be performed per the latest Aerojet test procedure AE26151/1 (ref. WBS 2.1.2) for both the A1 & A2 instruments. Included in this test is a review of the prevailing Vibration and Acceleration shop order (revise if required), perform a Test Readiness Review (TRR), Mass Sim. dry run, and Ground Fault Isolation Test Setup. System engineering will perform a Sub-Comprehensive Performance Test (Sub-CPT) per AE26156/3 or /4 after testing of each instrument axis. Post test task include data reduction, analysis, and report generation by mechanical or environmental or systems engineering.</p> <p>11. A Room Ambient Pressure Thermal Cycle test will be performed using the latest Aerojet test procedure AE26151/7 (ref. WBS 2.1.2) for both the A1 & A2 instruments. Included in this test is a review of the prevailing Thermal cycle Test shop order (revise if required), perform a Test Readiness Review (TRR), perform a dry run to validate chamber readiness, and survival heater activation. System engineering will perform a Sub-Comprehensive Performance Test (Sub-CPT) per AE26156/3 or /4 after the Thermal Cycle test. Post test task include data reduction and trend data analysis.</p> <p>12. A Thermal/Vacuum Calibration test will be performed using the latest Aerojet test procedure AE26156/5 or /6 (ref. WBS 2.1.2) for the respective A1 & A2 instruments. Included in this test is a review of the prevailing shop order (revise if required), perform a Test Readiness Review (TRR), chamber dry-run to validate chamber readiness, instrument & Calibration Test Equipment (CTE) setup and break down, STE setup and database verification, and trend analysis during portions of test. A Final Comprehensive Performance Test will be done at the conclusion of Thermal/Vacuum activities. Post test activities include analysis of data for calibration, and report generation.</p>		

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4 3.7.6	<p>INTEGRATION & TEST FM6 (Continued)</p> <p>13. A Momentum Compensation test will be performed on the A2 instrument using procedure developed in WBS 2.12. Included in this test is a review of the prevailing shop order (revise if required), perform a Test Readiness Review (TRR), and a Dry Run. Post test task include analysis and generation of a report.</p> <p>14. Using the latest AE 26151/3 test procedure, perform a Weight and C.G. test. Included in this test is a Test Readiness Review (TRR), and generation of a report.</p> <p>15. Perform a Pre-Ship Review (PSR) for both A1 and A2 instruments (CDRL 032). Included in this segment is generation of the final Performance Matrix (CDRL 222), final Trend Analysis, Acceptance Data Package, and Calibration Log Book Reports for the appropriate instrument.</p> <p>16. Installed instruments into shipping containers using the latest version of Handling Procedure document AE26357. Included in this task is extensive cleaning of container.</p> <p>17. Anomaly analysis and resolution for both instruments is included in this element. Generation of reports, if appropriate, will be done.</p> <p>18. Incorporation of ECNs developed during the course of implementing this element will be done.*</p> <p>Applicable specifications are S-480-80, S-480-79, GHS-3267415, UHS-2617547, UHS-2624483, CDRL 032, 029, 215, 222, 256, and various Aerojet procedures and specifications as indicated within the previous text of this element. Also reference letter "Integrated AMSU-A Technical Clarifications and Requirements" sent to the attention of Ms. Nancy Faman Lockard on 19 Sept. 95.</p> <p>Output will be flight ready AMSU-A1 and AMSU-A2 instruments that have been integrated and verified/ demonstrated in detail that performance requirements are within allowable tolerances per all the required NASA specifications. For A1 and A2 instruments accomplish PER & PSR; provide calibration log books, trend analysis, performance verification matrix providing summary of the performance and ensures instruments met mission requirements, provide acceptance data package related to instrument testing and generation of reports specific to imbedded testing during implementation of this element.</p>		
	*Refer to 4510-03-7650		

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		<p>INTEGRATION & TEST FM6 - (Continued)</p> <p>Excluded from this element is cost for material, travel, document processes such as, reproduction, publication, and distribution/shipping.</p> <p>Excluded from this element is cost for signal processor test at system level.</p> <p>Excluded from this element is RF coax cable material and conditioning and testing of the cable. The cost of this task and material is in RCVR account.</p> <p>Included is cost for liquid nitrogen (LN2) and supplies for use in dealing with ECN incorporation.</p>	

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	3.7.7	<p>INTEGRATION & TEST PARTS FABRICATION As required, in the Statement of Work (SOW) sec. 1.1, 1.2, 2.2, 2.3, 2.5 through 2.8, 2.11, and 2.14; rework parts required for all five flight systems. Included in the flight systems is the AMSU A1 and A2 instruments as referenced in SOW sec. 2.2 par. f.</p> <p>Under this element, parts required at the instrument integration level (top assembly) will be rework as required. Support for this activity includes: supervision and shop floor control, Quality Assurance (QA), purchasing for fab., shop order initiation and closure, and statusing throughout rework cycle.</p> <p>Excluded for this element is cost for materials and travel.</p> <p>Output will be hardware intended for flight model instruments as defined in the opening paragraph.</p> <p>Applicable specifications are: S-480-79, S-480-80, GHS-3267415, UIIS-2617547, UIIS-2624483 GIRD 422-11-12-01, UIID 422-12-12-02. Also reference letter "Integrated AMSU-A Technical Clarifications and Requirements" sent to the attention of Ms. Nancy Faman Lockard on 19 Sept. 95.</p>	

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4 3.8.1	<p>MANUFACTURING PIECE PART MATERIAL.</p> <p>Production Materials and its associated costs used in manufacturing of all the AMSU-A instruments. This account includes all the cost of material except for Major Subcontracts.</p> <p>SOW Ref: 1.1, 1.2, 2.3, 2.5, 2.6, 2.7, 2.8</p>		

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4	3.8.2	MAJOR SUBCONTRACTS. This is limited to those subcontracts with a value greater than 1 Million dollars and progress billings or Milestone payments. The Following are Major Subcontracts for this program. <table><tr><td><u>Supplier</u></td><td><u>Component</u></td></tr><tr><td>Litton</td><td>DRO/VCDO</td></tr><tr><td>FEI</td><td>DC/DC Converter</td></tr><tr><td>Spacek</td><td>Mixer/IF Amp</td></tr><tr><td>COI</td><td>A2 Reflector</td></tr></table> SOW Ref: 1.1, 1.2, 2.3, 2.5, 2.6, 2.7 and 2.8			<u>Supplier</u>	<u>Component</u>	Litton	DRO/VCDO	FEI	DC/DC Converter	Spacek	Mixer/IF Amp	COI	A2 Reflector
<u>Supplier</u>	<u>Component</u>													
Litton	DRO/VCDO													
FEI	DC/DC Converter													
Spacek	Mixer/IF Amp													
COI	A2 Reflector													

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<div>4</div> <div>3.8.3</div>	<div> <div>CRITICAL SPARES INVENTORY</div> <div> <p>Critical Spares are to provide sufficient inventory above projected requirements including attrition to assure timely delivery of the instrument.</p> <p>SOW. Ref: 2.14</p> </div> </div>

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4 10.1.1	<p><u>GSE & FIXTURES/SUPPORT</u> As required, in the Statement of Work (SOW) sec. 2.9 and 2.10; provide support for fabrication of Instrument Ground Support Equipment (IGSE) and Fixtures for EOS and METSAT.</p> <p>Work under this element will involve support for procurement and the procurement of common parts and material for the integrated program (EOS/METSAT). Also in this element are provisions for subteam leadership, fiscal analyst, refurbishment and checkout of the Calibration Test Equipment (CTE) used in the NOAA/KLM program.</p> <p>Specific work is as follows:</p> <ol style="list-style-type: none">1. Procurement support includes research and fact finding, cost analysis reporting (when required), and purchase order placement for items that include the Instrument Ground Support Equipment (IGSE) and hardware for the two thermal vacuum chambers used for calibration of both A1 and A2 instruments. Embedded in this effort is administration and maintenance of outstanding purchase orders.2. Subteam leadership involves team support and subteam management as well as providing technical direction and participation in program related meetings. Support will also include participation in the performance of 'in house' checkout of purchased parts.3. Included in this element is support from a fiscal analyst who will track, compile, analyze, and report on the individual cost accounts to the team leader and/or various segments of management.4. Refurbishment and checkout of the CTE used during the NOAA/KLM program will encompass tear down and disassembly/reassembly of key portions of the CTE. Electrical, functional, and integrity checks will be performed on all sections that make up the calibration test equipment. These include heaters, cable hookup, wire routing, logger programming, and targets. Refurbishment of targets will include overhaul of target surface, Platinum Resistance Thermometer (PRT) replacement, emissivity testing, plumbing leak checking, and functional testing. The described work will occur for both A1 and A2 CTEs with final testing in thermal vacuum.		

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4 10.1.1	<p>GSE & FIXTURES/SUPPORT - (Continued) Applicable specifications are: S-480-79, S-480-80, GISS-3267415, UJIS-2617547, UJIS-2624483, GIRD 422-11-12-01, UJID 422-12-12-02. Also reference letter "Integrated AMSU-A Technical Clarifications and Requirements" sent to the attention of Ms. Nancy Farnan Lockard on 19 Sept. 95.</p> <p>Excluded from this element is travel cost.</p> <p>Included is cost for new thermal vacuum flex hoses, (20 for A1 and 12 for A2), liquid nitrogen (LN2), electrical and mechanical supplies required to refurbish and test both calibration test fixtures.</p> <p>Output will be newly procured thermal vacuum hardware, STE hardware, and refurbishment of both A1 and A2 CTEs.</p>		

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4 10.2.1	<p>EOS GSE & FIXTURES/SUPPORT - (Continued)</p> <p>4. CTE cable drawings will be reviewed and updated as necessary to accommodate the EOS instruments. Engineering will support the procurement of new exterior and interior (thermal vacuum) cabling used with IGSE for both A1 and A2 instruments. Checkout of these cables after receipt by Aerojet will also be accomplished. This is for a total of 20 cables.</p> <p>5. A total of four Temp. Controlled Quartz Crystal Microbalance (TQCM) instruments will be procured for installation into thermal vacuum chambers used to test the A1 and A2 instruments. Engineering will prepare specifications, layout design, and support procurement in the purchase of this instrument. Engineering will then coordinate work to modify existing chambers, install, and test this instrument.</p> <p>6. Design and construction of Special Test Equipment (STE) for EOS as stated in memo response to "Action Items Quarterly Review/23 Aug 95, Item 8/23-3 Title: Special Test Equipment Requirements". Included in this task is support for design, procurement of required material, fabrication, assembly, programming, and checkout of completed system. Programming will be compatible with MIL-STD-1553 and checkout will include dry and formal test runs. Update to the STE Test Procedure and Software Documentation will be also be done in this element as well as test report generation. CDR action items and revisions specific to the STE software will be addressed during the course of this work.</p> <p>7. Procurement of two (2) shipping/storage containers are included in this element. Engineering will lend support to the procurement and checkout of these items. Checkout will include a 'fit check' which consist of temporally installing the handling plate for the EOS unit and verifying proper integration.</p> <p>8. Fabrication of fixtures for use in installing the A1 and A2 instruments onto the spacecraft will be included in this element. Work under this task will include shop order generation, procurement of materials, fabrication, assembly and test of fixture. Testing of these fixtures will include a twice (2X) the required working load holding test. (Quantity = 5) This assumes a spacecraft vertical installation.</p> <p>9. Handling fixtures/plates will be designed, material procured, fabricated, assembled, and tested for use with the EOS instruments. Testing will include a twice (2X) the required working load holding test. (Quantity = 6)</p> <p>10. Included in this element is modification to the existing CTE (specifically the KLM A1 calibration test fixture) to accept the EOS A1 instrument yet retain its use for the KLM A1 instrument. This effort will include design, material procurement, fabrication, assembly, and test. Testing will include a fit check of the EOS A1 instrument into the calibration test fixture.</p>		

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4 10.2.1	<p><u>EOS GSE & FIXTURES/SUPPORT - (Continued)</u></p> <p>11. Work on space craft mounting templates incorporating an alignment cube is part of this element. The task will require design, material procurement, fabrication, assembly, and test or validation. This activity will address both the A1 and A2 instruments. 1 set will be built for AMSU-A1, and 1 set will be built for AMSU-A2.</p> <p>Applicable specifications are: S-480-79, S-480-80, GISS-3267415, UIIS-2617547, UIIS-2624483, GIRD 422-11-12-01, UIID 422-12-12-02. Also reference letter "Integrated AMSU-A Technical Clarifications and Requirements" sent to the attention of Ms. Nancy Farnan Lockard on 19 Sept. 95.</p> <p>Excluded from this element is cost for travel.</p> <p>Included is the cost for liquid nitrogen (LN2).</p> <p>Output from this element will be 2 installation fixtures, updated procedures and reports, black body target set and its companion monitor, new STEs that operate the EOS instruments, new STE cables, installation of 2 TQCM instruments into thermal chambers, a space craft work station operating with the OASIS software, cryogenic cycling plate for A1 instrument, handling fixture/plate(s), mounting templates, and incorporation of design modification on the A1 calibration test fixture to support EOS calibration.</p>		

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4 10.3.1		METSAT GSE & FIXTURES/SUPPORT As required, in the Statement of Work (SOW) sec. 2.10; provide support for fabrication of Instrument Ground Support Equipment (IGSE) and Fixtures for METSAT. This element involves the design/modification and fabrication/assembly of Special Test Equipment (STE) as well as various fixtures associated with handling and testing of both A1 and A2 instruments. The specific work is as follows: 1. For the STE, design, fabricate or modify parts, assemble, and test three additional (i.e. new) STEs as stated in memo response to "Action Items: AMSU-A Quarterly Review/23 Aug 95", item "8/23-3 Title: Special Test Equipment Requirements". Software will be revised as needed and tested to verify proper system operation. Also, an update to the STE Operations Manual and Software Documentation will be accomplished. 2. Within this element is the fabrication and assembly of a Black Body target set along with its associated multi layer insulation (MLI) blankets. This target set will consist of 2 each A1 black body target assemblies (part no. 1333150-5 and 1333150-6) and 1 each A2 black body target assembly (part no. 1333202-3). These Black Body targets will be leak checked, tested for emissivity, and cooled with LN2 under vacuum to insure plumbing integrity. Along with this task is the design, fab., assembly, and check out of one Monitor box for use during the operation of this target set. This monitor will only display pertinent target data for the three targets that make up the set and it will have no direct control over target operating conditions. Finally, a functional test with target(s) engaged to the monitor box will be performed. Also included is procurement support of 3 shipping containers (P/N 1338403-1) for the target assemblies. 3. Electrical breakout boxes will be fabricated after a review and update of current design documentation. (Quantity=12) 4. Handling plates will be fabricated and proof tested under this element. Testing will include a twice (2X) the required working load holding test. 5. Procurement of four (4) shipping/storage containers are included in this element. Engineering will lend support to the procurement and checkout of these items. Checkout will include a 'fit check' which consist of temporarily installing the handling plate for the METSAT unit and verifying proper integration.		

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4 10.3.1	<p><u>METSAT GSE & FIXTURES/SUPPORT - (Continued)</u></p> <p>6. Fabrication of fixtures for use in installing the A1 and A2 instruments onto the spacecraft will be included in this element. Work under this task will include shop order generation, procurement of materials, fabrication, assembly and test of fixture. Testing of these fixtures will include a twice (2X) the required working load holding test. (Quantity = 5) This assumes a spacecraft vertical installation.</p> <p>Applicable specifications are: S-480-79, S-480-80, GISS-3267415, UUIS-2617547, UUIS-2624483.</p> <p>Also reference letter "Integrated AMSU-A Technical Clarifications and Requirements" sent to the attention of Ms. Nancy Faman Lockard on 19 Sept. 95.</p> <p>Excluded from this element is travel cost.</p> <p>Included is cost for liquid nitrogen.</p> <p>Output will be new break out boxes, new STEs that will operate the METSAT instruments, new handling plates, documentation that has been revised or updated, shipping/storage containers, and a black body target set and its companion monitor.</p>		

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4 10.4.1	<p><u>GROUND SUPPORT EQUIPMENT MATERIAL</u> As required, in the Statement of Work (SOW) sec. 2.9 and 2.10; provide material for fabrication of Instrument Ground Support Equipment (IGSE) and Fixtures for EOS and METSAT.</p> <p>This element only provides for the cost of material of \$1,139,795 to support the build of the IGSEs which consist of:</p> <ol style="list-style-type: none"> 1) 3 each Special Test Equipment (STE) set (includes associated cabling, breakout box, peripherals, mobile platforms). 2) Refurbishment of AMSU-A1 and AMSU-A2 calibration test fixture. 3) 2 each - Spacecraft black body target and monitor set (set consist of 3 targets and 1 monitor console and 3 target shipping containers). 4) Liquid Nitrogen Flowhoses for Thermal/Vacuum Chambers use to test AMSU-A instruments. (Quantity = 32) 5) Handling fixtures. (Quantity 18) 6) 4 each Temperature Controlled Quartz Crystal Microbalance (TQCM). 7) Shipping Containers. (Quantity = 6) 8) Mounting Templates. (Quantity = 2 sets) 9) Space Craft Work Station. (Quantity = 1) 10) Temperature Cycling Cryo Plate. (Quantity = 1) 11) Spacecraft Installation Fixtures. (Quantity = 10) 12) Vibration Fixtures. (EOS) 13) Weight and C.G. plate. (EOS) 14) CTE Thermal Vacuum Cables. (Quantity = 20) <p>Excluded from this element is travel and labor cost.</p> <p>Applicable specifications are: S-480-79, S-480-80, GHS-3267415, UHS-2617547, UHS-2624483, GIRD 422-11-12-01, UIID 422-12-12-02. Also reference letter "Integrated AMSU-A Technical Clarifications and Requirements" sent to the attention of Ms. Nancy Faman Lockard on 19 Sept. 95. Memo response to "Action Items: AMSU-A Quarterly Review/23 Aug 95", item "8/23-3 Title: Special Test Equipment Requirements".</p>		

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4 11.1.1	<p>PERFORMANCE ASSURANCE TEAM SUPPORT</p> <p>OVERVIEW:</p> <ul style="list-style-type: none"> • Provide Management of the Performance Assurance Team comprised of Quality Assurance and Design Assurance elements (Reliability and EEE Parts Selection), System Safety, and Materials and Processes. Assume that tasks assigned to the Performance Team by Contract, CDRL, PAR or internal Aerojet procedures are implemented in a timely and cost effective manner. Assume resources are identified and made available to support Program Milestones. Escalate problems affecting product performance, quality, safety or reliability to Program and Functional Management. (SOW 1.1, 1.2, 2.11, PAR 1.2, 1.4) • Provide project planning required to support the program (SOW 2.1.1) <p>SPECIFIC DUTIES:</p> <ul style="list-style-type: none"> • Supervise the Quality Assurance and Design Assurance, Safety and Parts/Materials Functions to assure that the Performance Assurance Requirements (PAR) are implemented as described in the Performance Assurance Implementation Plan (PAIP) Report Number 10399A. (PAR 1.2) • Act as primary interface to the Customer on all matters related to Performance Assurance and issues. (PAR 1.4) • Assure adequate resources are available when needed to support Performance Assurance (PA) requirements. (PAR 1.4) • Conduct periodic Performance Assurance Coordination Meetings to disseminate information affecting Performance Assurance activities, programmatic issues and Customer concerns. • Represent Performance Assurance at meetings involving suppliers, internal functions and the Customer - CDR, PER, PSR, etc. (PAR 2.3) • Escalate problems to the Program Office affecting product quality, reliability, performance or safety. • Oversee Performance Assurance budget and schedule performance. (SOW 2.1.1) • Monitor/evaluate Performance Assurance support to suppliers, fabrication and test areas (Bldg. 118, Bldg. 57 and Bldg. 183) • Provide back-up support to the Quality Engineering functions. • Provide Performance Assurance Status Reports to the Program Office. (PAR 1.5) • Arbitrate issues not resolvable at Performance Assurance engineer's level.; Escalate to Program and Functional Management as required. • Provide Fiscal Analyst support to establish and maintain project planning activities for the PA section (SOW 2.1.1) 		

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4 11.1.1	<p>PERFORMANCE ASSURANCE - COMMON</p> <p>SYSTEM SAFETY OVERVIEW: System Safety Engineering provides system safety program support for Aerojet Electronic Systems for the EOS METSAT Program. This support includes the technical and administrative direction to plan and implement the requirements and program of Section 4 of the Performance Assurance Implementation Plan, Report 10399A, dated October 1994 as required by Section 4 of the Performance Assurance Requirements (PAR), GSFC-S-480-79, Section 8 and 10, dated October 10, 1994.</p> <p>Specific Tasks:</p> <ol style="list-style-type: none"> 1. Implement the System Safety Implementation Plan (SSIP) to ensure the identification and control of hazards to personnel and hardware. This will include interfacing effectively with industrial safety and Ensuring that requirements are flowed down to subcontractors. (PAR 4.2) 2. System Safety Engineering will provide support for Aerojet Electronic Systems Division Environmental Testing of EOS METSAT units to include: <ul style="list-style-type: none"> Review and concur with all environmental test procedures for EOS METSAT units. Participate in Test Readiness Reviews. Periodically monitor testing in progress. Monitor training program for test operations (engineers, supervisors and technicians). Monitor test equipment. 3. System Safety Engineering will provide system safety program support for Aerojet Electronic Systems for the EOS METSAT Program CDR. This support includes preparing for and attending the CDR. (SOW 3.0 and 4.8) 		

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4	<p>PERFORMANCE ASSURANCE - COMMON (Continued)</p> <p>4. System Safety Engineering will prepare and maintain CDRL 107, Operations Hazards the Analysis and CDRL 224, Safety Compliance Data Package for Aerojet Electronic Systems for EOS/METSAT Program.</p> <p>EXCLUSIONS/INCLUSIONS:</p> <ol style="list-style-type: none"> 1. System Safety will not review drawings and specifications for safety implications. Because this is primarily a heritage program there should be limited safety risk in this approach. Product Assurance and Design Assurance personnel will alert system safety engineering if any design or process appears to have safety implications. 2. Weekly team meetings are not costed after May 1996. 3. Only system safety support for one CDR is costed. 		

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Level of CWBS Element	CWBS Definition
<div>4</div> <div>11.1.1</div>	<p>PARTS CONTROL</p> <p>Overview: Plan and implement a parts control program in accordance with the provisions of the PAR Section 5 "EEE Parts Control Requirements" dated 6/28/95. The approach to meeting the requirements is detailed in Aerojet's Parts Control Plan (PCP), dated 8/24/95.</p> <ul style="list-style-type: none"> • CDRL 109 - Update EOS Parts/Device Stress Analysis as required for AMSU-A (see PCP para. 5.2.8.) • CDRL 212 - Prepare an estimated two alerts against suppliers of EEE parts. • CDRL 213 - On a monthly basis, research GIDEP alerts for impact on AMSU-A (Ref. PCP para. 5.4). • CDRL 214 - On a monthly basis or as required, respond to NASA problem notices (Ref. PCP para. 5.4). • CDRL 525 - Support generation of an as-built parts list for each delivery (Ref. PCP para. 5.3.1) • CDRL 527 - Generate and maintain an "As Designed Parts List" (see Para. 5.3 of PCP). Plan is for 5 major updates, generated after Parts Control Meetings to include part approval/disposition information. Using same database maintain a program approved parts list (Ref. PCP para. 5.2.3). • Parts Control Board - As described in 5.2.2 of the PCP, a Parts Control Board (PCB) will facilitate management, selection standardization and control of EEE parts. With implementation of the new PAR Section 5 and the new Parts Control Plan, the review/approval of part applications is done using on-site PCB meetings. To complete this effort the following PCB meetings are planned: <ul style="list-style-type: none"> > 3 at Aerojet > 2 at Litton > 1 ea. at Phonon, FEL, Daden, St. Microwave, DDC and Vernitron

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4 11.1.1	<p><u>PARTS CONTROL (Continued)</u></p> <ul style="list-style-type: none"> • Compile documentation and prepare agenda for PCB meetings and their review of all part applications (both preferred and non-preferred). • Upgrade Aerojet Standards (AS) to include parts (e.g., cables, connectors, misc.) for use on AMSU-A which require additional screening/testing to meet program requirements (Ref. PCP, para. 5.2.1). It's estimated 10 AS documents will need upgrading. • Parts Specifications - Prepare/revise product specifications to ensure procurement of non-standard EEE parts (e.g., microcircuits, hybrids) in accordance with program requirements (Ref. PCP, para. 5.2.4). From October 1995 forward it is estimated 6 specifications will require preparation. • DPA Review - Review and disposition DPA reports for each lot of EEE parts where DPA is required as defined in the PCP, para. 5.2.10. • DPA Sample/PWB Coupon Archival/Retrieval - Establish and maintain a system for storing, cataloging and retrieving DPA samples and PWB coupons. <p>W.P. 02 - Component Radiation Assessment</p> <ul style="list-style-type: none"> • Evaluate supplier's components for radiation survivability requirements. • Support the Aerojet CDR with analysis and presentation materials <p>(NOTE: Task previously under W.O. 4170-13-2121. Transferred to P.A. section as part of baselining activities.)</p>		

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4	11.1.1	<p><u>PARTS CONTROL (Continued)</u></p> <ul style="list-style-type: none"> • Parts Procurement Support - Due to diminishing sources for high reliability/Class S components, provide support to the procurement group as required throughout the procurement phase. • Radiation Hardness - Perform assessments of AESD and supplier piece parts. Prepare Rad. Hardness Presentation for AESD CDR. (PAR 5.2.4) & Parts Control Plan (PAR 5.2.9) <p><u>Exclusions due to reduced budget:</u></p> <ul style="list-style-type: none"> • Review of FAR Database • Establishment of database for storage/tracking of DPA samples/ PWB coupons • GIDEP/NASA alerts affecting the K,L,M contract are not covered by this WBS. • Travel funds for PCB meetings at Phonon, FEI, Daden, St. Microwave, DDC and Vernitron not in original estimate. 	

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Contract Work Breakdown Structure Dictionary	<div> <div>Program: Integrated AMSU-A</div> <div>RFP No.: 5-16372/433</div> <div>Contract No.: NAS5-32314</div> <div>Date: 26 February 1996</div> </div>
Level of CWBS CWBS Element	CWBS Definition
<div>4</div> <div>11.1.1</div>	<div> <div>DESIGN ASSURANCE</div> <div> <p>OVERVIEW: Provide Design Assurance support for all customer reviews (CDRs, MRRs, Quarterlies and Monthlies).</p> <ul style="list-style-type: none"> • CDRs - Preparation of Vu-graphs describing status of Design Assurance and Parts Control tasks. This is to be done for both the CDR and the Delta CDR (SOW 4.8). • MRRs - Preparation of Vu-graphs summarizing Design Assurance and Parts Control activities which support manufacturing readiness. This is to be done for both the Antenna MRR and the System MRR. (SOW 4.16 & 4.17) • Quarterly Reviews - Preparation of Vu-graphs providing quarterly updates of Design Assurance and Parts Control activities. (SOW 4.3) </div> <div> <p>RELIABILITY</p> <p>OVERVIEW: Plan and implement the requirements of Section 7 "Design Assurance and Reliability Requirements", and para. 8.13.2.1 "Control, Reporting, and Disposition of Failures" of the PAR GSFC-S-480-79.</p> <ul style="list-style-type: none"> • CDRL 108 - FMEA - Review EOS FMEA and update for METSAT configuration. Assume only minor modification required (Ref. PAR, para. 7.3.1). • CDRL 110 - Reliability Assessment - Update EOS assessment for METSAT configuration. Assume only minor modification required (Ref. PAR, Para. 7.3.2). </div> </div>

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4 11.1.1	<p>RELIABILITY (Continued)</p> <ul style="list-style-type: none"> • CDRL 207 - Performance Assurance Status Reports - Support monthly preparation of P.A. Status Reports. • CDRL 209 - Malfunction/Failure Reports - Prepare and submit a failure report at time of occurrence of each flight hardware failure (Ref. PAR, para. 8.13.2). • CDRL 211 - Problem and Failure Close-out Reports - Prepare and submit a Failure Analysis Report (FAR) for close-out of each malfunction/failure report (CDRL 209). • Failure Analysis/Databasing - Perform failure analysis to determine cause, corrective action and action to prevent recurrence and compile data necessary to prepare Close-out Reports (CDRL 211). Maintain a computer database of all FARs (Ref. PAR para. 8.13.2.1). • Failure Review Board - Chair the Failure Review Board which ensures complete analysis of all failures and implementation of appropriate corrective actions (Ref. PAR, para. 8.13.2.2). • Weekly/Monthly Reporting - Prepare weekly reports of accomplishments/plans and provide input for monthly reports. (PAR 1.5) • Subcontractor Surveillance - Ensure flow-down requirements are implemented by sub-tier suppliers and audit as required. (PAR 7.1) • Internal Meetings/Reviews/Actions - Support internal meetings/reviews and perform assigned action items. • Drawing/Specification Review - Review/approve all drawings, product specifications, statements of work and ECNs. • Preship Review and Preparation - Support review and preparation of all documentation required for delivery with shipment of each unit. (SOW 4.15) 	

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4 11.1.1	<p>QUALITY ASSURANCE OVERVIEW</p> <ul style="list-style-type: none"> • Provide QA support including Quality Engineering, Supplier Inspection, Material Review Board, and QA Documentation Center to the Design, Procurement, Fabrication and Testing of one EOS and four METSAT flight systems and related Special Test Equipment (STE). Assure that AMSU Performance Assurance Requirements (PAR) GSFC-S-480-79, Section 8 and 10, Dated 10 October 1994 are implemented as documented in the Performance Assurance Implementation Procedure (PAIP), Report 10399A, dated October 1994. <p>Specific Tasks (and PAR/SOW Reference):</p> <ul style="list-style-type: none"> • Attendance and participation in major contract milestone meetings, technical sessions and customer audits. (PAR 2.3, 2.5, SOW 4.8) • Support/program of activities identified by EOS/METSAT Team Leaders. (PAR 1.2) • Review and approved technical data such as drawings, specification, parts lists, purchase orders, materials list, test procedures, and shop orders used to define, build or testing of flight hardware. (PAR 8.10.4, 8.11, 8.12, 8.15, 8.15.3, 8.16, 8.21, 8.19, 1.7.2) • Review/Approve reports addressing parts requirements, DPA results, and system safety issues. (PAR 1.5) • Issuance of weekly and monthly status reports. (PAR 1.5) • Supporting the Parts Control Board and Failure Review Board activity. (PAR 8.13.2) • Reviewing and assessment of GIDEP/NASA Alerts. (PAR 8.14) • Evaluation of contract modifications. (SOW 2.1) • Implementing Program Office Directive requirements (SOW 2.1). • Evaluation/approval of Design Changes. (PAR 8.3) • Performance of supplier QA system surveys and assistance to upgrade supplier's QA system to NHB 5300.4 (1B) requirements (PAR 8.5, 8.10.3) • Assessing performance to budget and schedules. (SOW 2.1.1) • Escalation of problems affecting hardware/software performance, safety and/or reliability (PAR 1.1, 1.2). • Identification of Processes and Personnel requiring Certification per NHB Standards (PAR 8.10.3, 8.20) • Interfacing with the Customer on issues related to and Q.A. responsibilities. (PAR 1.6) • Participate in the Manufacturing Readiness Review by reviewing/ approving Shop Orders, updated process procedures and identification of any new Inspection Requirements. (SOW 4.16 and 4.17). 		

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4 11.1.1	<p>QUALITY ASSURANCE (Continued)</p> <ul style="list-style-type: none"> Monitoring and control of subcontractors including flow-down of Performance Assurance requirements. Identify QA requirements for each Purchase Order and assure requirements are properly stated in the PO, SOW, or Specification as applicable. (PAR 1.7.2, 8.5) Quality Engineers and Source Inspectors certified to NHB requirements. (PAR 8.10.3, 8.20) Review and approve Supplier generated SDRL Items for QA Plans, Mfg./Insp./Test flow charts, process procedures, etc. (PAR 1.7.2, 8.5) Supporting Receiving Inspection, fabrication and testing areas to resolve problems, updating/modifying shop orders, test procedures and other supporting documentation. (PAR 8.9, 8.13.1, 8.13.1.3, 8.15.4) Perform as chairperson of the Material Review Board (MRB) to disposition "use-as-is" and "Repair" dispositions and corrective action. (PAR 8.13, 8.13.1.3, 8.13.1.4) Support fabrication, testing and proofing of GSE/STE and Shipping Containers. (PAR 8.17, 8.21.3) Maintenance of files and records for tasks relevant and required to perform the Quality Engineer tasks. (PAR 8.1) Storage and archiving of closed shop orders by the QA Documentation Center (PAR 8.5.5, 8.10.2, 8.15.5, 8.20.3) Identify Metrology requirements for any new Mfg., Test or Inspection Equipment. (PAR 8.17) Coordinate the receipt, inspection and shipment of Gov't owned property (PAR 8.22) Provide software QA per CDRL 309. (PAR Section 10 SOW 4.5, 4.7, 4.11, 4.13) Initiate and/or support initiation and approval of the CDRL's; generated by QA and the Integrated, Product Teams. (SOW Attachment E, CDRL List.) Provide As-Built data verification (Shop Orders) in support of Pre-shipment Review Required for each delivery (SOW 4.15). <p>Inclusions/Exclusions:</p> <ol style="list-style-type: none"> QA support (QE, Certification Program and Inspection) hours to certify the PLO SMT Line is covered by the 2.2.2 WBS. If a two shift operation is initiated in 1997, the QE and Inspection staff will be split in two to provide two shift coverage. This will reduce the QA personnel headcount available to support a given shift. This could result in QE and Inspection back-log and delays. 		

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4 11.1.2	<p><u>PERFORMANCE ASSURANCE - EOS</u> This element covers the performance assurance activities delineated in the PAR document and includes the following:</p> <p><u>SYSTEM SAFETY:</u> This element provides for the effort involved in reviewing and monitoring the implementation of an approved safety program which will identify and control hazards to personnel, facilities, support equipment, and the EOS/AMSU-A instrument during all stages of program development in accordance with Chapter 4 of the PAR.</p> <p><u>PARTS CONTROL:</u> The contractor shall plan and conduct a parts control program in accordance with Chapter 5 of the PAR. Under the program, only parts with acceptable, demonstrated performance and reliability shall be used. When possible, only standard parts will be used.</p> <p><u>MATERIAL AND PROCESS CONTROL:</u> This element provides for the effort involved in the implementation of a comprehensive materials and processes program in accordance with Chapter 6 of the PAR.</p> <p><u>RELIABILITY:</u> This element provides for the overall effort necessary for the contractor's planning and implementing a reliability program that interacts with assurance programs for design, parts, materials, testing, and other space program activities in accordance with Chapter 7 of the PAR.</p> <p><u>QUALITY ASSURANCE:</u> This element provides for the overall effort necessary for the contractor to establish, document, and ensure compliance with design control requirements and quality criteria during all phases of the contract work in accordance with Chapter 8 of the PAR.</p> <p>SOW Ref: 1.1 and 2.1.1</p>		

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4 12.1.1	<p><u>SPACECRAFT INTEGRATION - EOS</u></p> <p>1. This cost account covers the effort required to support cleanliness verification activities and inspection at spacecraft contractor site. Also includes materials preparations and verification analyses and report results.</p> <p>Spacecraft Integration Support - provide support for integration of the AMSU-A instrument into EOS. 4 trip to S/C contractor is anticipated.</p> <p>Included in this element is cost for travel.</p> <p>Applicable specifications are: S-480-79, S-480-80, GISS-3267415, UUIS-2617547, UUIS-2624483, GIRD 422-11-12-01, UIID 422-12-12-02. Also reference letter "Integrated AMSU-A Technical Clarifications and Requirements" sent to the attention of Ms. Nancy Faman Lockard on 19 Sept. 95.</p> <p>SOW Ref: 1.1, 2.12</p>		

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4	12.2.1	<p><u>SPACECRAFT INTEGRATION - METSAT</u> As required, in the Statement of Work (SOW) sec. 1.2, 2.2, 2.12, 2.13, and 4.19; the contractor will provide technical support for the METSAT and METOP Flight Model Instruments from shipment through 3 months of post launch.</p> <p>Task is for the contractor to provide technical support for the METSAT and METOP FM AMSU-A units from storage, shipment through instrument integration to the spacecraft. The contractor shall provide personnel and facilities necessary for supporting integration and test activities at both the contractor's plant and / or the spacecraft integration facility, including instrument bench checkout, providing technical support during integration of the instrument to the spacecraft, performing all required repairs and retests, and conducting electrical system checkout following integration.</p> <p>The specific task is as follows:</p> <ol style="list-style-type: none">1. Bench test the FM3 unit at the spacecraft facility (METSAT), two trips, with one person for A1 and a second person for A2. Trips will be for two days length of stay at the spacecraft facility.2. Provide on site support at the spacecraft facility (METSAT) for FM3 unit integration. Anticipated is one trip of three days length of stay at the spacecraft facility for one person.3. Bench test the FM4 unit at the spacecraft facility (METSAT). Two trips of two days length of stay at the spacecraft facility for two people (one for the A1 instrument and one for the A2 instrument).4. Bench test AMSU-A1 and AMSU-A2 unit at the spacecraft facility (METOP). There will be two trips of four days length of stay at the spacecraft facility for two people. Also, included during this trip is support for spacecraft integration by these personnel.5. Not included in this work element is:<ol style="list-style-type: none">a) storage or storage testing of FM3, FM4, FM5, and FM6. This is per S. Krimchansky and B. Mehlretter telecon dated Feb. 95.b) Engineering support at the METOP spacecraft facility.c) Performing required repairs, retest, electrical systems checkout following integration.		

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4 12.2.1	<p>SPACECRAFT INTEGRATION - METSAT (Continued)</p> <p>6. It is also noted that additional spacecraft integration support required will be directed by task order and generated by the NASA Technical Office (S. Krimchansky). Necessary budgets will also be provided by stated NASA office.</p> <p>Applicable specifications are: S-480-79, S-480-80, GISS-3267415, UIIS-2617547, UIIS-2624483.</p> <p>Included in this element is cost for travel, shipping of FM3 through FM6 instruments, and 2 sets of STE.</p> <p>Output will be technical support and delivery of flight instruments and STE.</p>

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<p>4 13.1.1</p>	<p>EOS FIELD SUPPORT: Provide technical support in evaluating data returns to assure instrument calibration and accuracy. Included in this effort is support for all EOS instruments at the launch facility, anomaly investigations, analytical studies and support for the STE. Also included in the effort is troubleshooting/rehab./repair of any instrument subsequent to delivery and acceptance by the Government.</p> <p>SOW Ref: 1.1, 2.13, and 2.13.1</p>		

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4 13.2.1


METSAT FIELD SUPPORT, TASK ORDERS

Task Orders shall be utilized only for the following types of effort:

1. Trouble-shooting for instruments delivered to and accepted by Government.
2. Anomaly investigation on operational AMSU-A instruments.
3. Studies of potential spacecraft-to-instrument changes.
4. Studies to evaluate enhanced instrument performance.
5. Planning activity in response to requests from the European Space Agency, or agencies of foreign countries.

Reference: Contract Section C.3 "Task Assignments and Reports

SOW Ref: 1.2, 2.13, and 2.13.1

 National Aeronautics and Space Administration				Report Documentation Page			
1. Report No. ---		2. Government Accession No. ---		3. Recipient's Catalog No. ---			
4. Title and Subtitle Integrated Advanced Microwave Sounding Unit-A (AMSU-A), WBS Diagram and Task Description Dictionary				5. Report Date April 1996			
				6. Performing Organization Code ---			
7. Author(s) D. White				8. Performing Organization Report No. 10734			
				10. Work Unit No. ---			
9. Performing Organization Name and Address Aerojet 1100 W. Hollyvale Azusa, CA 91702				11. Contract or Grant No. NAS 5-32314			
				13. Type of Report and Period Covered Final			
12. Sponsoring Agency Name and Address NASA Goddard Space Flight Center Greenbelt, Maryland 20771				14. Sponsoring Agency Code ---			
15. Supplementary Notes ---							
16. ABSTRACT (Maximum 200 words) This is the WBS Diagram and Task Description Dictionary for the Advanced Microwave Sounding Unit-A (AMSU-A).							
17. Key Words (Suggested by Author(s)) EOS Microwave System				18. Distribution Statement Unclassified --- Unlimited			
19. Security Classif. (of this report) Unclassified		20. Security Classif. (of this page) Unclassified		21. No. of pages 109		22. Price ---	

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The last page of a report facing the third cover is the Report Documentation Page, RDP. Information presented on this page is used in announcing and cataloging reports as well as preparing the cover and title page. Thus, it is important that the information be correct. Instructions for filling in each block of the form are as follows:

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Block 9. Performing Organization Name and Address. Provide affiliation (NASA program office, NASA installation, or contractor name) of authors.

Block 10. Work Unit No. Provide Research and Technology Objectives and Plans (RTOP) number.

Block 11. Contract or Grant No. Provide when applicable.

Block 12. Sponsoring Agency Name and Address. National Aeronautics and Space Administration, Washington, D.C. 20546-0001. If contractor report, add NASA installation or HQ program office.

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elsewhere: affiliation of authors if additional space is required for Block 9, notice of work sponsored by another agency, monitor of contract, information about supplements (file, data tapes, etc.) meeting site and date for presented papers, journal to which an article has been submitted, note of a report made from a thesis, appendix by author other than shown in Block 7.

Block 16. Abstract. The abstract should be informative rather than descriptive and should state the objectives of the investigation, the methods employed (e.g., simulation, experiment, or remote sensing), the results obtained, and the conclusions reached.

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6. AUTHOR(S) D. White				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Aerojet 1100 W. Hollyvale Azusa, CA 91702			8. PERFORMING ORGANIZATION REPORT NUMBER 10734 April 1966	
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13. ABSTRACT (Maximum 200 words) This is the WBS Diagram and Task Description Dictionary for the Integrated Advanced Microwave Sounding Unit-A (AMSU-A), A1.				
14. SUBJECT TERMS EOS Microwave System			15. NUMBER OF PAGES 75	
			16. PRICE CODE ---	
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Prescribed by ANSI Std Z39-18
298-102

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